

The Genus *Wendlandia*.

BY

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With Plates CCXXXII-CCXXXV.

The genus *Wendlandia* in the *Rondeletieae* section of the Rubiaceae was proposed by Bartling (in his *Ordines Naturales*, 1830, p. 211) in honour of Heinrich Ludolph Wendland, curator of the Botanic Garden at Hanover. No description accompanies the first mention of the name, but it was adopted and described by De Candolle in his *Prodromus* (vol. iv, 1830, p. 411). At an earlier date the name *Wendlandia* was applied by Willdenow to an entirely different group of plants (Willd. *Sp. Pl.* ii (1799), p. 275). The latter belong to the Menispermaceae, and for them the name of *Cocculus* has been retained, and *Wendlandia* of Willdenow became a *nomen rejiciendum* in the list of the Vienna Congress of 1905. The name *Wendlandia* of Bartling thus stands as a genus of the Rubiaceae. *Rondeletia* of Roxburgh and Wallich is synonymous with it (but not *Wendlandia* of Willdenow).

All the species which belong to the genus *Wendlandia* Bart. are small trees and shrubs, natives of India, the East Indian Archipelago and China, with one doubtful species as a western representative in Persian Kurdistan, and another occurring as far east as New Guinea.

In habit they range from a dwarf prostrate shrub a few inches high, to a tree attaining a height of 60 to 80 ft.

On account of the prevalence of some of its species in tropical and sub-tropical deciduous forests, and on scrub land, the genus is an important one to the forester, and several species are worthy of the attention of the horticulturist both for tropical and temperate gardens. Roxburgh considered *Wendlandia exserta* as one of the greatest ornaments of the Calcutta Botanic Garden during the month of March, and *Wendlandia speciosa* should prove an attractive shrub in British gardens.

No comprehensive work on *Wendlandia* has, hitherto, been published, but the Indian species known at the time of its publication (1882) were described in the *Flora of British India*. Subsequent authors, dealing with the Indian species, have, for the most part, followed Hooker's classification. As for the Javanese species most of these

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were included by Miquel in his *Flora Indiae Batavae*, but this work has had to be modified by later writers. For descriptions of the representatives which are found in the Philippine Islands, in other parts of the East Indian Archipelago and in China it is necessary to consult the copious literature which is cited here under each individual name. As will appear, this is scattered throughout many journals, so that the naming of species of *Wendlandia* is not a simple matter. Added to this there is the further difficulty that existing descriptions frequently give insufficient data for closely allied species to be readily distinguished. Troubles experienced in naming Indian and Chinese plants led to a careful examination of the available material in order to discover which characters could be considered of diagnostic importance. When the whole of the genus had been reviewed it was found necessary to establish as valid species certain plants which had hitherto not received recognition and to reduce others to the rank of sub-species or varieties, as well as to regard some names as synonyms.

In order to illustrate the more important problems which the genus presents, the species *Wendlandia paniculata* DC. and its allies may be cited. This group of plants has proved to be one of the most confusing problems with which I have had to deal. The inter-relationships of its various members are discussed in detail later, here it will suffice to note only the salient points.

The true *W. paniculata* DC. is an Amboyna plant which was, however, described from specimens cultivated in the Royal Botanic Garden, Calcutta. The same name has been given to a number of Indian, Philippine and Chinese plants with similar general characteristics, but others, differing in no greater degree from the type, have been described as distinct species. In Indo-China, for example, there are several forms of *W. paniculata* DC., if the name is used in its widest sense. Some of these have been described as distinct species, others have retained the name *W. paniculata* DC. Those that are referred to here, are all very closely related to each other but the affinity of any one of them is with another Indo-Chinese plant rather than with the Amboyna plant. With regard to plants from other regions which fall within this group, similar remarks often apply with equal force. Consequently we find that very closely related plants have been separated from each other under different names, whereas others less closely akin have been considered identical for they bear the same name. In this manner the inter-relationships of the species, sub-species and varieties have now become completely confused. Actually, within the major group there are a number of relatively distinct units which may be regarded as species, but some of these units are not homogeneous and constitute minor groups, the units of which are less distinctive and should probably be regarded as geographical forms of a single species.

A very much clearer conception of *W. paniculata* DC. and its allies would be obtained if the members of the group were arranged under a nomenclature which would show their proper status within the complex. So to arrange them, however, is not an easy matter, for there is a good deal of overlapping even between some of the more easily recognised members of the group. The main difficulty lies in deciding at which points dividing lines should be drawn. Starting with the Amboyna plant, and considering the other forms, which in a general way resemble it, dividing lines—if such are to be made at all—must be drawn somewhat arbitrarily. Fortunately forms from the same geographical region are fairly constant.

To leave the group in its present state of confusion would not be helpful. I have therefore regarded as distinct species such forms as can, with reasonable clearness, be separated from all others and, having made this main division, those which differ less markedly have been recognised as sub-species or varieties.

The above remarks will have served to illustrate the main problems which this series presents, and in dealing with the group which centres round *W. tinctoria* DC. a similar method of treatment has been adopted. Outside these two series the species are comparatively easy to segregate, and call for no special mention here.

In discussing the genus as a whole there are one or two further points of a general nature which ought to be noticed. Firstly, throughout this work all the specimens quoted have been examined by the writer unless there is a definite statement to the contrary.

Secondly, in the Wallich Herbarium at Kew, where the types of many of the Indian species are to be found, the sheets have separate numbers and letters but, on each sheet, there is often more than one specimen. Frequently more than one species is found under a single number and sometimes two quite distinct species are mounted upon the same sheet. The Wallichian specimens in other herbaria do not always agree with those of the corresponding number in the Wallich Herbarium. Some sheets bear a number only, the letter which follows having been omitted. In view of the confusion which would arise by citing Wallichian numbers, without detailed explanations in the text, a list of the 90 Wallichian sheets examined with the determination of the various specimens upon them, is given in an appendix.

Thirdly, regarding species from China and the East Indian Archipelago, the material at my disposal has sometimes been scanty. It appears that species have in certain instances been described upon very inadequate or immature material, greatly adding to the difficulty of dealing with subsequent collections from these areas. Ample material from the islands east and west of Java and from Indo-China would have been of great assistance in the elucidation of the relationships of some of the less distinct species from these regions. When it becomes available some modification of the arrangement here adopted may doubtless be necessary.

Fourthly, since undertaking this work I have had no opportunity of studying the genus in the field, and the fact that none of the species of *Wendlandia* are in cultivation has proved a considerable handicap. How far diversity in certain respects is due mainly to environment can only be settled by further observations of growing plants. Meanwhile, in view of the difficulty in classifying certain species of *Wendlandia* it will be useful to record the degree of variation which has been observed throughout the genus with special reference to such characters as are of diagnostic significance. This will be found in the pages which follow.

Before concluding these introductory remarks I would express my indebtedness to the Directors of the Royal Botanic Gardens, Kew, of the British Museum and of the Paris Herbarium, to the Superintendent of the Royal Botanic Garden, Calcutta, and to Prof. W. G. Craib of Aberdeen for the courteous loan of material. I have thus had at my disposal a large number of specimens and have been able to examine the types or co-types of the great majority of the species here mentioned. I would also record my grateful thanks to Prof. Sir W. W. Smith and to Mr. W. E. Evans for much valuable help and criticism. Acknowledgment is also due to Miss E. R. Stott, who prepared and mounted careful dissections of the flowers, and to Miss B. G. Watts, who is responsible for the accompanying illustrations.

THE GENERAL CHARACTERISTICS OF THE GENUS.

In the preceding paragraphs some account of the distribution, habits and characteristics of the genus has been given. The range of variation and relative importance of the various characters of diagnostic significance may now be discussed in greater detail.

The COROLLA of *Wendlandia* is either tubular or salver- or funnel-shaped. In the adult flower the tube of the corolla is either cylindrical or it expands upwards, in some species being as much as 2-3 times as wide at the mouth as it is at the base. Immature flowers are often more nearly cylindrical than the fully developed flowers of the same plant, (in *W. ferruginea* Pierre, the corolla is said to be rotate.)

The minimum length of the corolla tube in the genus is about 2 mm., the maximum about 10 mm., usually the variation in the size of the flowers of a single species does not exceed 1 mm. if young and poorly developed flowers are excepted. The breadth of the tube, relative to its length, differs from one species to another.

Although all these variations in the corolla are helpful in classifying the species it should be noted that the total range of divergence is small and often not readily recorded, but when a direct comparison is made by laying the flowers of one species directly upon that of another, the differences can more readily be appreciated. The length

of the corolla lobes in proportion to that of the tube is a character which has been used in classification. It is a feature of some importance since the tube may be anything from one to eight times as long as the lobes.

In most species the corolla is hairy within and it is usually upon the middle third of the tube that the hairs are borne. They may also be found in the lower, or sometimes in the upper, third, and vary in length and stiffness. In some species the hairs project at the throat of the corolla. Although there is considerable divergence in this character, it is not of great use diagnostically.

The presence of hairs upon the outside of the corolla tube is a character of somewhat doubtful constancy. In most species the tube is glabrous without and the presence of a few scattered hairs has been regarded by some writers as of specific significance. Careful examination with a lens will sometimes reveal hairs upon the corollas of species supposed to lack them. The type specimen of Miquel's *W. trichantha*, based upon this character, shows the external hairs remarkably well, but since such hairs are by no means absent in *W. dasythyrsa* Miq., following others, I have united these two species. The same course has been followed in other instances.

Hairs upon the outside of the corolla lobes are of comparatively rare occurrence. They are clearly visible on the type sheet of *W. floribunda* Craib, particularly upon the buds, where they form a terminal tuft, but how far this character is of real significance remains to be seen. Three plants collected by Dr. Henry at Szemao, Nos. 10,176, 10,176A and 10,176B, which differ only as regards the presence of hairs upon the corolla lobes and upon the receptacle, have been determined as *W. tinctoria* DC., *W. floribunda* Craib and *W. glabrata* DC. respectively. They differ from the Javanese *W. glabrata* DC. in the shape of the corolla tube, but closely resemble *W. floribunda* of Siam, which has, however, a shorter corolla tube and differs in its calyx lobes. These plants from Szemao, as well as *W. floribunda*, may all be regarded as forms of *W. tinctoria* DC., which is known to extend from Central India to Yunnan.

The CALYX in the whole genus varies considerably both in shape and in hairiness. It may be densely hairy, pubescent or quite glabrous and the presence or absence of hairs is a very useful diagnostic character, although its importance has been over-emphasised. There are several instances where plants, apparently on account of a glabrous calyx, have been identified with the Javanese *W. glabrata* DC, although they differ from it in every other character. The receptacle is normally longer than broad but rarely these proportions are reversed. The persistent calyx lobes vary in shape from broadly rounded to narrowly or widely triangular, or they may be ovate or awl-shaped and blunt or acute. In *W. paedicalyx* Pitard the calyx lobes are distinctly spatulate. In size the lobes may be minute, mere

excrescences upon the receptacle, or they may exceed the receptacle in length. The length of the lobes relative to that of the receptacle is of considerable help in separating the species, but minor variations cannot be regarded as of special importance. The difficulty of accurately defining the relative lengths—for the whole of the calyx is small—somewhat limits the use of this characteristic.

The STAMENS, on the other hand, are very distinctive. Many species have small ovoid or elliptic anthers about as broad as long (e.g., *W. tinctoria* DC. and *W. paniculata* DC.). Others (e.g., *W. exserta* DC. and *W. longidens* Hutch.) have linear or oblong anthers several times as long as broad. By this feature the species of the genus can be classified into two well defined groups. Observation has also shown that the length of the filaments also permits a relatively sharp division of the genus. The filaments arise from between the corolla lobes and in some species are exceedingly short so that the anthers just protrude from the corolla tube; in others they are much longer and carry the anthers some distance beyond. Only one or two species show signs of an intermediate condition. Further, it has also been observed that (with a few exceptions) the ovoid or elliptic anthers are sessile or sub-sessile, and the linear or oblong anthers have the relatively long filaments and are much exserted. The exceptions to be noted are *W. glomerulata* Kurz, with much exserted ovoid anthers, *W. coriacea* DC., *W. Gamblei* Cowan, *W. Heyneana* Wall. and *W. angustifolia* Wight, with almost sessile, linear or oblong anthers.

The character of the stamens is the most constant that I have found within the genus, moreover, when the two types have been recognised they are relatively easy to distinguish.

The STYLE in *Wendlandia* is always exserted. Generally it is quite glabrous, but in two species, *W. ligustrina* Wall. and *W. speciosa* Cowan, it is sparsely but distinctly hairy. The lobes of the bifid stigma vary in size and in shape in the different species, from broadly ovate or triangular and flat to narrow or awl-shaped. Between these extremes there are intermediate gradations of all kinds, so that this character rarely aids in determination. *W. pendula* DC., however, differs from all other species by having an undivided or clavate stigma.

The CAPSULE is not an important diagnostic factor. It is small, globose, crustaceous, 2- (rarely 3-) locular and loculicidal or rarely septicidal. The ovules are numerous, on small globose placentas adnate to the septum. The seeds are very minute, compressed and obscurely winged. The embryo is short and cylindrical, enclosed in fleshy albumen.

The INFLORESCENCES, of dense thyrsoid or paniced cymes or many flowered corymbs, are always terminal and may be spreading or compact.

The BRACTS and BRACTEOLAS vary in shape and in size. The lower bracts are either large, resembling the other leaves of the plant, or

much reduced. The bracteoles are frequently serrate and more or less hastate at the base, and either exceed or are shorter than the calyx. One or more is found on each peduncle, but owing to the congested arrangement of the flowers they are somewhat difficult to see on dried material.

The LEAVES of *Wendlandia* are opposite or rarely ternately whorled. They are entire, membranous or coriaceous, usually 5-12 nerved, the veins in several cases more or less anastomose near the margin. The upper surface of the leaf may be tomentose, scabrid or glabrous, but a strong lens will usually reveal some hairs, at least on the midrib. The underside may be glabrous, but usually with the midrib more or less pubescent. Many of the allies of *W. paniculata* DC. have long strigose hairs on the undersides of the leaves (at least on the nerves). The petiole varies in length, but is never as much as half the length of the lamina, and some species have sub-sessile leaves.

The STIPULES are either triangular and pointed or cuspidate (rarely bicuspidate) and more or less erect, or they are rounded, with a foliaceous, orbicular, reflexed tip. The examination of a large amount of material has led to the conclusion that both kinds of stipules probably do not occur upon the same plant, and Koorders and Valetton who have studied the Javanese species, agree with this view. To the occurrence of bicuspidate stipules, attention was first drawn by Wight and Arnott, who named a South Indian species *W. bicuspidata*. I am inclined to regard this form as an incidental modification of the cuspidate type developed by the splitting of the stipule. It does not appear to be a very constant character. Several specimens from Ceylon with cuspidate stipules are similar in other respects to specimens with bicuspidate stipules. In fact both cuspidate and bicuspidate stipules are to be found upon the same plant. On young shoots of *W. tinctoria* DC. and of *W. grandis* Cowan bifid stipules are occasionally to be found. The bicuspidate character of the stipule is therefore of small significance, but the distinction between cuspidate and rounded forms may be regarded as of considerable importance. From the flowers alone it is extremely difficult to separate some of the *W. paniculata* DC. group from *W. tinctoria* DC. and its allies, for the differences in floral characters are minute, but an examination of the stipules readily prevents confusion. The genus can therefore again be divided into two groups, namely, plants with cuspidate (or bicuspidate) stipules, and plants with stipules which are orbicular and reflexed. Numerically these groups are nearly equal.

SYSTEMATIC TREATMENT.

Schumann in the Pflanzenfamilien (vol. iv, p. 37) divided the genus into two sections :

Euwendlandia—with the corolla tube several times longer than the short corolla lobes, e.g., *Wendlandia paniculata* DC., and

Brachysiphon—with the corolla tube only a little longer than the corolla lobes and the anthers much exserted, e.g., *W. exserta* DC.

To this arrangement there are serious objections.

Firstly, it separates into different sections species which are certainly nearly related, e.g., *W. exserta* DC. and *W. puberula* DC., both from N.W. India ; at the same time it brings together species not very closely allied, e.g., *W. tinctoria* DC. from India, and *W. paniculata* DC. from Amboyna.

Secondly, it is inconvenient for out of the 59 species in the genus only very few fall into the section Brachysiphon upon a strict interpretation of the clause relating to the relative length of the corolla lobes.

Thirdly, with reference to the corolla lobes, although there is a clear distinction between the terms "several times longer" and "only a little longer than" the corolla tube, actually the tube is 1, 2, 3 . . . 8 times longer than the lobes in different species. Accordingly it is exceedingly difficult to draw a line anywhere through this series, and whatever interpretation of "several times" is adopted a large number of intermediate forms have to be taken into consideration.

Fourthly, this simple division does not sufficiently emphasise certain distinctive characters, e.g., the clavate stigma of *W. pendula* DC., if this species is to be retained in the genus.

Some alternative classification must therefore be found.

From what has already been said, it will be clear that according to the type of stamen the species fall naturally into two series. It will also have been evident that they can be classified according to the form of their stipules. With the few exceptions already noted the species with sessile stamens have ovoid anthers and those in which the stamens are much exserted have elongated anthers. Using these combined characters to classify the species there is very little likelihood of confusion between the two groups thereby formed. Closely allied species are brought together and in no case are nearly related species widely separated.

I have accordingly based the classification of the genus mainly upon the characters of the stamens, dividing it into two series, *Euexsertae* and *Subinclusae*. These series have again been divided into sub-series according to the nature of the stipules, the *Cuspidatae*

and Orbiculares, and the Tinctoriae and Paniculatae. *W. longidens* Hutch. and *W. subalpina* W. W. Smith, dwarf shrubs with somewhat anomalous flowers, are placed in a separate series, and *W. pendula* DC., with a clavate stigma, in yet another. The distinguishing characteristics of the four series thus formed, and of their sub-series, are summarised in the following key.

KEY TO THE SERIES AND SUB-SERIES.

A. Stigma bifid.

a. Shrubs, small or medium sized trees, flowers in dense terminal thyrsoid or paniced cymes. Leaves exceeding 4 cm. in length.

1. Anthers borne on distinct and relatively long filaments and projecting beyond the corolla tube, linear or at least twice as long as broad (except *W. glomerulata*).

Series I. **Euexsertae** (p. 241).

x. Stipules pointed. Sub-series 1. **Cuspidatae** (p. 242).

y. Stipules rounded and reflexed.

Sub-series 2. **Orbiculares** (p. 248).

2. Anthers sessile or nearly so, ovoid or elliptical, and less than twice as long as broad (except *W. coriacea*, *W. Heyneana* and *W. Gamblei*).

Series II. **Subinclusae** (p. 256).

x. Stipules pointed.

Sub-series 1. **Tinctoriae** (p. 260).

y. Stipules rounded and reflexed.

Sub-series 2. **Paniculatae** (p. 284).

b. Dwarf or prostrate shrubs, flowers in terminal and sub-terminal many flowered corymbs. Leaves not exceeding 4 cms. in length.

Series III. **Montigenae** (p. 301).

B. Stigma clavate.

Series IV. **Clavigerae** (p. 302).

SERIES I—EUEXSERTAE.

In this series the anthers are borne on relatively long filaments which are clearly visible and are at least as long as the anthers, which are very definitely exserted. The anthers (except in *W. glomerulata* Kurz) are at least twice as long as they are broad. They are linear, or linear oblong, with a cordate or sagittate base. In *W. glomerulata* they are ovoid, and about as broad as long.

The series is divided into two sub-series, the Cuspidatae and the Orbiculares, according to whether the stipule is cuspidate and erect or rounded and reflexed.

The species within this series are quite distinct and easily separable.

I. SUB-SERIES CUSPIDATAE.

Key to the Species.

- A. Calyx lobes longer than the receptacle, style with a few strigose hairs. 1. *W. ligustrina* (p. 242).
- B. Calyx lobes shorter than the receptacle, style glabrous.
- a. Leaves lanceolate, margins incurved. 2. *W. salicifolia* (p. 244).
- b. Leaves elliptic to ovate-oblong, margins flat.
- i. Leaves sparsely or somewhat densely hairy below. Receptacle pubescent. 3. *W. puberula* (p. 245).
2. Leaves glabrous below, or puberulous only on the main nerves.
- i. Receptacle pubescent. 4. *W. sikkimensis* (p. 246).
- ii. Receptacle glabrous. 5. *W. formosana* (p. 247).

i. *Wendlandia ligustrina* Wall. Cat. 6272, pro parte; Don, Gen. Syst. ii (1834), p. 518; Steud. Nom. Bot. (1841), p. 786; Miq. Flor. Ind. Batav. ii (1860), p. 347; Kurz, For. Flor. Burma ii (1877), p. 74; Hook. f., Flor. Brit. Ind. iii (1882), p. 39. Brandis Ind. Trees (1906), p. 374.

Wendlandia nitens Hook. f., l.c., p. 38 pro parte; Brandis l.c., p. 374, non Wall.

Rondeletia ligustrina Wall. MS. (1827).

BURMA.—Maymyo: 42 miles from Mandalay, flowers whitish, December 1888, Dr. King's Collector, Badul Khan Nos. 304 and 305; Maymyo, alt. 3500 ft., small tree in a swamp, flowers white, 12th August 1912, J. H. Lace No. 5885; Maymyo, alt. 3000 ft., large shrub or small tree, 24th October 1908, J. H. Lace No. 4356; Maymyo, 1 Tree Hill, alt. 3600 ft., 12th September 1915, A. Rodger No. 180; Maymyo, alt. 3500 ft., October 1914, along streams, H. H. Haines sine no., same locality, H. H. Haines No. 5666; Maymyo, vern. *Kon-thit-ni*, 15th October 1926, Ba Pe No. 3191; Maymyo, alt. 3050 ft., 27th September 1929, vern. *Waso-ban*, small tree 10 ft., flowers white, Maung Ba Pe No. 9640; Maymyo, 8th September 1931, small tree 15 ft. high, grows near water, Maung Ba Pe No. 12219; Maymyo, alt. 2000 ft., in Thondaung Forests, 7th October 1928, Maung Kan No. 2489; Gokteik, alt. 2000 ft., January 1908, A. E. Meebold No. 8023.

Southern Shan States: Taungyi, alt. 5200 ft., small tree about 15 ft., flowers in October, October 1901, W. H. Craddock No. 77; Taungyi, 1893, flowers white, Abdul Khalil in Herb. Calcutt.; Saga, flowers pink, 1894, Abdul Khalil in Herb. Calcutt.; Shan Hills, February 1892, Abdul Huk No. 62; Fort Stedman, December 1892,

Abdul Huk in Herb. Calcutt ; Makaye Hill (in fruit), flowers yellow, 1893, Dr. King's Collector in Herb. Calcutt. ; Tenasserim, in Herb. E. Ind. Co., Helfer, Kew Distrib. No. 2830, in Herb. Calcutt. ; Taong Dong. Wallich Cat. No. 6272, 25th November 1826 (type).

CHINA.—Yunnan: valley of the Salwin, Salwin-Irrawadi divide, between Ship Chi Ti and Pei Pa, lat. $26^{\circ} 15' N.$, alt. 6-7,000 ft., amongst scrub on dry exposed hillsides, a branched shrub of 6-9 ft., flowers creamy-yellow, fragrant, November 1905, G. Forrest No. 866 ; on the Yung-pe Mountains, lat. $26^{\circ} 45' N.$, alt. 9,000 ft., a shrub of 10-18 ft., flowers creamy-white, fragrant, open situations on the margins of thickets, September 1913, G. Forrest No. 11413 ; Mekong-Salwin divide, lat. $26^{\circ} 40' N.$, alt. 8000 ft., shrub of 3-5 ft., flowers creamy-white, fragrant, amongst scrub in side valleys, July 1919, G. Forrest No. 18221 ; in the Salwin Valley, in open thickets in side valleys, lat. $27^{\circ} N.$, long. $98^{\circ} 40' E.$, alt. 7-8000 ft., a shrub of 5-6 ft., flowers fragrant, creamy-white, October 1924, G. Forrest No. 25976.

The type of *W. ligustrina* Wall. under Wallich Catalogue number 6272, is represented by three sheets (Nos. 65-67, p. 311-312), one in the Wallich Herbarium at Kew and two in Calcutta. This is a very distinct species. (Another sheet under this number in the Calcutta Herbarium has no perfect flowers, but is probably *W. tinctoria* DC.)

The type material of *W. ligustrina* Wall. is good and the distinctive characters specially to be noted are the much exserted anthers, the long corolla lobes, the calyx lobes longer than the receptacle, the style sparsely covered with long bristly hairs, and the cuspidate stipules.

The earlier descriptions of this species are not altogether accurate, partly, perhaps, on account of the presence of the fourth sheet under this number, but there has also been confusion between this species and *W. nitens* Wall. Cat. No. 6271.

In the published descriptions the data given are insufficient to distinguish clearly the two species. In the Wallich Herbarium, Wall. Cat. No. 6271 is represented by one sheet without flowers and there is a second similar sheet under this number in the Calcutta Herbarium. In my opinion both these sheets agree with the fourth sheet of No. 6272 and are probably *W. tinctoria* DC. The material is too poor for certain determination. The locality for the specimens, Wallich No. 6271, is given as the Attram River, but in view of the statement that follows this cannot be taken as certain. Possibly specimens and labels may have become mixed when these were mounted.

W. nitens was first described by Hooker in the Flora of British India, but his description is not based (at least entirely) upon the Wall. Cat. 6271 sheets referred to above, although Hooker definitely cites this number. The type of *W. nitens* Hook f. (vix Wall.) are two sheets also from the Attram river. These are of Helfer's collecting

under Kew Distribution No. 2830 and are quoted by Hooker. In this case the locality is no doubt correct.

Since all four specimens are supposed to have come from Tenasserim, it is possible that Hooker regarded Helfer's plants as being under Wall. Cat. 6271 since they formed part of the East India Company Herbarium. There is, however, nothing to indicate definitely that they are or were part of the Wallich Herbarium. The flowers on the Helfer sheets, though in bud, are well enough developed to show their structure, and they are identical with those of *W. ligustrina* Wall. Cat. No. 6272, the type of which is represented by the first three sheets quoted above.

Helfer's plants have the long calyx and corolla lobes, the much exerted anthers and the barbate style, which, taken together, are unique characters of *W. ligustrina* Wall.

The leaves are somewhat more coriaceous than in the type, but there is no doubt as to the identity of the plants. It follows that *W. nitens* Wall. is probably *W. tinctoria* DC., and *W. nitens* Hook. f. (non Wall.) is *W. ligustrina* Wall.

The name *W. nitens* Wall. has priority of place though not of date over that of *W. ligustrina* Wall. But in view of the poorness of the material and confusion as to the specimens of this species I prefer to drop the name *W. nitens*. Whichever name is adopted, some modification of the original descriptions is necessary, as neither applies only to one species.

The name *W. ligustrina* Wall. is therefore retained for the very distinct species represented by Wall. Cat. No. 6272 *pro. maj. parte*, with the following amendments to the published descriptions.

G. Don in Gen. Syst. iii, p. 518 states that the plant is glabrous in every part. Hooker, in the Flora of Brit. India iii, p. 37, observes correctly that the nerves on the under side of the leaves are puberulous. The panicle is also pubescent. Both Don and Hooker describe the calyx lobes as shorter than the receptacle, whereas they are longer.

Later publications have followed the Flora of British India and should be amended accordingly.

2. *Wendlandia salicifolia* Franchet MS. in Herb. Mus. Paris; Castello in Jour. de Bot. ix (1895), p. 208; Pitard in Flore Générale de L'Indo Chine iii (1922), p. 60.

Ligustrum Thea Lévl. et Dunn in Fedde, Repert. x (1911) p. 14.

CHINA.—Yunnan: Hankei, Red river, shrub 3-4 ft. high, A. Henry No. 9559; Bord du fleuve Rouge à Sin-Kai près Manghao, 31st January 1891, Delavay No. 4894; Kweichan, river beds, 16th December, 1904, Esquirol No. 327.

INDO-CHINA.—Tonkin, Cho-bo, arbrisseau, corolle blanche, 14th November 1887, B. Balansa No. 2588 (type).

An almost glabrous shrub easily distinguished by its lanceolate,

acuminate, shortly petioled leaves with margins slightly incurved. The affinity of this species is with *W. ligustrina* Wall. From *W. angustifolia* Wight MS., which it superficially resembles, it differs by having a shorter corolla, short and hairy calyx lobes and more exerted style and stamens. It can readily be separated from *W. formosana* Cowan and *W. ligustrina* Wall. by the shape of its leaves.

3. *Wendlandia puberula* DC. Prod. iv (1830), p. 412; Don, Gen. Syst. iii (1834), p. 518; Steud. Nom. Bot. (1841), p. 786; Hook. f. Flor. Brit. Ind. iii (1882), p. 37, pro parte; Brandis Ind. Trees (1906), p. 373; Wall. Cat. 6270, pro parte, and 6269c.

INDIA.—N.W. India: without precise locality ex Herb. Royle in Herb. Kew; without precise locality, alt. 1-4000 ft., T. Thomson in Herb. Ind. Or. Hook. f. & Thomson; Jaunsar, Thadiar, alt. 3000 ft., 5th June 1900, Upendranath Kanjilal, No. 794; above Thadiar, alt. 4000 ft., 21st June 1906, H. H. Haines No. 2266.

Chamba State: Chamba to Rakh, alt. 3500 ft., 8th June 1896, J. H. Lace No. 1412.

Punjab: Kangra, Palampur, alt. 4000 ft., 26th September 1895, G. A. Gammie No. 18743.

United Provinces: Mussoorie, side of stream towards Chakrata, alt. 4-5000 ft., 1st July 1878, F. Duthie sine no.; Mussoorie, near Kampti Bridge, July 1878, ex Govt. Gardens, Saharanpur for Dr. King No. 547; below Kampti, alt. 5000 ft. ? October 1878, J. F. Duthie sine no.; below Mussoorie, 3rd May 1870, G. King in Herb. Calcutt.; Dehra Dun, Sansaru Khola, alt. 3500 ft., 10th December 1901, Upendranath Kanjilal No. 1019.

Kumaon: without definite locality, Wall. Cat. No. 6269c; Ramgunga Bridge, Pelora, alt. 2-4000 ft., T. Thomson No. 1136, and a second sheet, June 1845, (T. Thomson No. 1136); without precise locality, ex Herb. E. Ind. Co., in Herb. Kew; near Bagesar, alt. 3000 ft., 3rd May 1848, R. Strachey and J. E. Winterbottom No. 2.

Gharwal: near Binsaur, 1843, M. P. Edgeworth; Atahmunda Valley, 1843, M. P. Edgeworth; Hardwar, 1843, M. P. Edgeworth; without precise locality, G. King in Herb. Calcutt.; above Deghat, Surjoo Valley below Binsaur, alt. 3500 ft., Col. Madden's collection; without definite locality, Herb. Falconer ex Herb. East Ind. Co. in Herb. Kew.

NEPAL.—Without precise locality, Wall. Cat. No. 6270, pro parte, (type).

Wall. Cat. No. 6270 pro parte is the type of *W. puberula* DC., since under this number there are two distinct species. The second is *W. appendiculata* Wall. MS., which differs from *W. puberula* in having rounded stipules and in other points as described below. Under Wallich's Catalogue No. 6270 five sheets (Nos. 53-57, p. 311) are *W.*

puberula DC., and five sheets (Nos. 58-62, p. 311) are *W. appendiculata* Wall. MS. descript. Cowan. Five sheets from Kumaon under Wall. Cat. No. 6269c are also *W. puberula* DC.

Among the Indian species of the series Euexsertae, *W. puberula* DC. most resembles *W. Wallichii* W. et A., *W. exserta* DC. and *W. appendiculata* Wall. in flower, but it has distinctly larger flowers than the first two species and from all three it differs by having cuspidate and not rounded, reflexed stipules. Its foliage is characteristic, the leaves being large, ovate oblong, acute at both ends, glabrescent above and hirsute-puberulous beneath. The panicle is rather dense and robust, the receptacle and calyx lobes are somewhat pubescent, the anthers are long and far exserted, and the stigma has two thickish lanceolate terminal lobes. It is not clavate as described by De Candolle, and the species is not akin to *W. pendula* as suggested by Wight and Arnott.

In the Flora of British India Hooker includes both *W. appendiculata* Wall. MS. and *W. scabra* Kurz under *W. puberula* DC. How he came to confuse *W. scabra* Kurz with this species is not easy to understand. *W. scabra* Kurz differs markedly from *W. puberula* DC. not only in its flower, with ovoid, almost sessile, anthers, but also it has rounded stipules and it is the Burmese representative of *W. paniculata* DC.

In a note on a sheet of *W. appendiculata* Wall. MS. Hooker points out that this species has the flowers of *W. puberula* DC. and the stipules of *W. paniculata* DC. He did not note differences in foliage. As the form of the stipule is of considerable importance in separating species of *Wendlandia*, it is inadvisable to unite *W. appendiculata* Wall. with *W. puberula* DC. which by this and other characters are readily separable from each other.

4. *Wendlandia sikkimensis* Cowan. Sp. nov.

Species ex affinitate *Wendlandiae puberulae* DC., filamentis brevioribus, calycis lobis longioribus, foliis glabris elliptico-oblongis divergens.

Arbor, ramis annotinis circa 3 mm. diametro griseo-brunneis deinde decorticantibus, hornotinis teretibus leviter rugosis brunneo-rufis. Folia opposita membranacea integra elliptica vel elliptico-oblonga, utrinque glabra, usque at 15 cm. longa 5 cm. lata, apice acuta vel longiuscule acuminata basi cuneata, costa supra complanata, infra prominente, nervis haud confertis arcuatis 7-9-paribus. Petiolus sulcatus 1-2.5 cm. longus. Stipulae persistentes coriaceae glabrae triangulares distincte cuspidatae plus minusve carinatae circa 3 mm. longae et latae. Inflorescentia terminalis sparsim pubescens circa 20 cm. longa, diametro brevior; bracteae lineares vel subulatae 2-6 mm. longae. Flores sessiles satis numerosi plerumque 3-fasciculati, tubi corollini fauce albido-hirsuti, apud os distincte dilatati, circa

3 mm. longi, lobis ovatis tubo 3-4-plo brevioribus. Calyx vix 1 mm. longus distincte pubescens ad tertiam partem in lobos triangulares fissus. Antherae lineares vel oblongae circa 1.5 mm. longae, distincte exsertae, filamentis circa 1 mm. longis. Stylus lobis lanceolatis bifidus. Fructus deest.

INDIA.—Bengal and Sikkim: Darjeeling District, Sivoke, 2nd March, 1867, S. Kurz in Herb. Calcutt. sine no. (type); Ridges of Sivoke Hills, February 1874, J. S. Gamble No. 3720E; Singari Pahar, Sivoke, 17th February 1876, J. S. Gamble No. 437B.

At Sivoke, where the Tista emerges from the hills to the plains, the forests on the lower slopes, which are not easily accessible, form one of the most interesting localities in the Darjeeling District from the botanical point of view. Here several species which have been collected only once in Sikkim have been found, and the *Wendlandia* now described adds another plant to the rarities from this region.

Wendlandia sikkimensis, hitherto placed under various names, is quite distinct although it resembles other species in several respects.

From the North-West Himalayan *W. puberula* DC., from which it differs least in flower, it can be readily separated by its glabrous and elliptic or elliptic-oblong leaves. From other Sikkim species it can be easily distinguished by the following characters. *W. sikkimensis* has cuspidate stipules, whereas those of *W. Wallichii* W. et A. are rounded, reflexed and early deciduous. The leaves of the two species are different in texture and venation. In *W. coriacea* DC. the receptacle is glabrous not pubescent, the stamens are less far exserted and the leaves are coriaceous with more closely set veins. *W. sikkimensis* differs from *W. grandis* Cowan by its linear exserted anthers, narrower leaves and by having cuspidate stipules without a ligulate tip. In *W. formosana* Cowan from Formosa, with which this species might also be confused, the receptacle is glabrous and the leaves are very much smaller.

5. *Wendlandia formosana* Cowan. Sp. nov.

Wendlandia glabrata Maxim. in Mém. Biol. xi (1883), p. 777, pro parte, non DC.; Hemsley in Journ. Linn. Soc. xxiii (1888), p. 371 pro parte, non DC.

Wendlandia Heyneana Nakai in Journ. Arn. Arb. v (1924), p. 83, non Wall.

Ab *Wendlandia ligustrina* Wall., cui proxima est, lobis calycis brevioribus, receptaculo glabro facile distinguitur; ab *Wendlandia glabrata* DC. staminibus valde exsertis antherisque linearibus inter alia diversa.

Arbuscula vel frutex elatus; ramuli juniores rubiginosi, breviter et parce pubescentes, obsolete quadrangulares vel subteretes, circa 3 mm. diam. leviter sulcati. Folia membranacea, 9-13 cm. longa 3-5 cm.

lata, elliptica vel elliptico-lanceolata, breviter et plus minusve subito acuminata vel nonnunquam acuta, supra glabra in sicco atroviridia costa impressa infra pallidiora ad costam nervosque prominentes arcuatos minutissime pubescentia, caeterum glabra, nervis secundariis bene reticulatis, in petiolum tenuem 1.5 ad 2.5 cm. longum attenuata. Stipulae late triangulares, subglabrae vel etiam margine inconspicue hirsutulae, ad basim complanatae apice cuspidibus erectis nunc divergentibus praeditae. Inflorescentiae terminales, patentes, ad 4 cm. longae partibus junioribus brunneo-pubescentibus, aliis glabrescentibus; flores 1-2- vel raro 3- fasciculati, sessiles vel saepius breviter pedunculati, bracteis inferioribus lanceolatis superioribus minimis linearibus; pedunculi bracteolis minutis unicus vel binis ornati. Calyx fere ad tertiam partem divisus, plerumque glaber nunc ad marginem loborum sparsim pilosulus, lobis rotundatis vel subacutis triangularibus. Corollae tubus 4 mm. longus, apud os leviter dilatatus, lobis quadruplo longior. Stamina longe exserta, antheris linearibus filamentis antheras paulo superantibus. Stylus apice bifidus lobis ellipticis. Capsula glabra calycis lobis coronata.

FORMOSA.—South Cape, A. Henry No. 924 (type), in Herb. Edin.; Tamsuy, 1864, Richard Oldham No. 227 (2 sheets, in flower and fruit); common round Horisha, Nanto, alt. 1-2000 ft., 9th March 1918, bush 10-20 ft., in fruit, E. H. Wilson No. 10,078 (I take this to be the same species).

A very distinct species easily recognised by its pointed stipules, long-exserted, linear anthers, glabrous receptacle and calyx lobes shorter than the receptacle. From *W. glabrata* DC., with which it has been confused, the Formosan plant is readily separated by the character of its anthers. The affinity of this species is probably with *W. ligustrina* Wall. from which it differs markedly in its calyx lobes and by the absence of hairs on the style. Its pointed stipules at once distinguish it from *W. Wallichii* W. et A. and from *W. speciosa* Cowan the only other species with which it is likely to be confused.

2. SUB-SERIES ORBICULARES.

Key to the Species.

A. Panicle of short slender branches with flowers crowded near the tips. Anthers ovoid, about as long as broad.

6. *W. glomerulata* (p. 249).

B. Panicle robust spreading, flowers singly, or grouped, on the branches. Anthers linear, at least twice as long as broad.

a. Leaves pubescent above, tomentose or greyish pubescent below. Corolla lobes longer than the tube.

7. *W. exserta* (p. 249).

b. Leaves glabrous above, glabrous, or with a few hairs on the nerves, below. Corolla lobes shorter than the tube.

i. Receptacle glabrous, stipules early deciduous.

8. *W. Wallichii* (p. 252).

2. Receptacle hairy or pubescent, stipules persistent.

i. Leaves glabrous below. Style with a few strigose hairs.

9. *W. speciosa* (p. 254).

ii. Leaves with a few hairs on the nerves below. Style glabrous.

10. *W. appendiculata* (p. 255).

6. *Wendlandia glomerulata* Kurz in Journ. Asiat. Soc. Bengal xii (1872), p. 310, For. Flor. Brit. Burma ii (1877), p. 75, Journ. Asiat. Soc. Bengal ii (1877), p. 129; Hook. f. in Flor. Brit. Ind. iii (1882), p. 40; Brandis Ind. Trees (1906), p. 374.

BURMA.—Tenasserim: Mergui, Griffith, ex coll. Walker Arnott No. 749 (type), and Kew Distrib. Herb. Helfer No. 2838 (3 sheets); Bowachoung, April 1911, A. Meebold No. 15395; without precise locality, March 1911, A. Meebold No. 14441; Mergui, shrub 2 metres high, on hot rocky river banks about high flood level, 24th January 1927, R. N. Parker No. 2471; Tenasserim South, banks of Tenasserim river about sea level, a shrubby tree, 5 or 6 feet high, flowers white or greenish, vern. *Ye-Ye-Bin*, 28th February 1926, C. E. Parkinson No. 1955 bis; Mergui, sea level, shrub, flowers white, 14th February 1930, Su Koe No. 10,901.

This is an interesting species, unique in the genus in having much exerted stamens with, at the same time, small ovoid anthers. It is easily recognised by its linear-lanceolate to lanceolate leaves, foliaceous reflexed stipules, sessile flowers congregated into short stalked bundles, forming a compact panicle, and by its long hispid calyx teeth.

Kurz described this species among "New Burmese Plants" in 1872 from Griffith's material, and the type is under Griffith's No. 749 (Kew Distribution No. 2838).

It is only on the banks of the Tenasserim River near the town of Mergui that this very distinct species is known to occur. After Griffith's collecting it was not again found till Meebold gathered it in 1877; in 1926 the plant was collected for the third time by Mr. C. E. Parkinson of the Indian Forest Service.

7. *Wendlandia exserta* (Roxb.) DC. Prod. (1830), p. 411; E.I.C. Mus. tab. 1363; Don, Gen. Syst. iii (1834), p. 518; W. et A. Prod. i (1834), p. 402, 403; Bedd. Fl. Sylv. S. India, ii (1874), p. cxxx; Hook. f. Flor. Brit. Ind., iii (1882), p. 37; Brandis Ind. Trees (1906), p. 373.

Rondeletia exserta Roxb. Hort. Beng. (1814), p. 14, Fl. Ind. ii (1820), p. 135; Wall. Cat. 6267, A, C, D, E, F.

- Rondeletia Heynei* Roem. et Sch. Syst. v. (1819), p. 234.
Rondeletia thyrsiflora Roth, Nov. Gen. et Spec. (1821), p. 141.
Rondeletia orissensis Roth, Nov. Gen. et Spec. (1821), p. 142.
Rondeletia Oryssensis Roth ex DC. Prod. iv (1830), p. 411
 and W. et A. Prod. i (1834), p. 402.
Rondeletia cinerea Wall. Cat. No. 6268 (1828), Roxb. Flor.
 Ind. ii (1820), p. 141.
Wendlandia cinerea DC. Prod. (1830), p. 412; Don, Gen.
 Syst. iii (1834), p. 518; Steud. Nom. Bot. (1841), p. 786.
Bertiera Tilia Buch. Ham. MS., pro parte, in Herb. Edin.
Rondeletia cana Wall. MS. in Herb. Calcutt.

INDIA.—Without precise locality, Wall. Cat. No. 6267A (type).

N. W. India: without definite locality, Herb. Royle sine no. in Herb. Kew; W. Himalaya, without definite locality, Herb. Griffith No. 2838-1; without definite locality, alt. 1-4000 ft., 25th May 1848, T. Thomson in Herb. Calcutt.

Punjab: Chenab river, alt. 1000 ft., October 1846, T. Thomson in Herb. Ind. Or. Hook, fil. et Thomson; Ravee Valley, on the ascent from Pathankot to Nurpur, alt. 3000 ft., 21st May 1878, G. Watt No. 440; Pathankot, alt. 1000 ft., 8th May 1917, R. R. Stewart No. 1731; Chamba, below Bakloh to Dhar, alt. 2-4000 ft., 13th April 1900, J. H. Lace No. 2120; Kangra, alt. 2000 ft., in flower 28th April 1900, Forester Chowdri Ram No. 101 and (in fruit) 6th June 1901, No. 480; Hooshiarpore, Aitchison, in Herb. Calcutt. sine no.; Simla Hills, 1885, J. R. Drummond Nos. 22693, 23821, 24182, 24183, 24826, 24827; Simla, Suni, alt. 3000 ft., April 1891, G. Watt sine no.; Simla, near Kukhrhati, alt. 2000 ft., June 1878, Coll. Dooni in Herb. J. S. Gamble, Nos. 6236A, 6236C.

United Provinces: Jaunsar, Kalsi, alt. 3000 ft., April 1891, J. S. Gamble No. 22978; same locality, April 1898, J. S. Gamble No. 26536; Hardwar, Wall. Cat. No. 6267D; Garhwal, Kunsnow Ghat, Herb. Falconer in Herb. Kew.; Garhwal, Bhabur, G. King in Herb. Calcutt.; Ascent to Nynee Tal, April 1844, without Collector, No. 739 in Herb. Kew.; Kumaon, Bagesar, alt. 3000 ft., R. Strachey and J. E. Winterbottom No. 1; Kumaon, A. G. Hobart-Hampden, in Herb. G. Watt No. 13; East Kumaon, Wall. Cat. No. 6267 in Herb. Calcutt. and Wall. Cat. No. 6267E. Oudh, Wall. Cat. No. 6267C; Oudh, January 1873, Coll. R. Thompson, Comm. Dr. Brandis No. 178; Gorakhpur, 24th April 1898, J. F. Duthie No. 22370B; Gorakhpur, 19th April 1898, J. F. Duthie No. 22370C.

Bombay: Kothrood near Poona, G. Watt in Herb. Edin.; North Thana Division, F. Gleadow, Deputy Conservator of Forests, ex Herb. Watt in Herb. Edin.; without precise locality, M. Law in Herb. Kew.; without precise locality, Gibson ex Herb. Hooker in Herb. Kew.; Igathpoora, Western Ghats, 1884, Dr. T. Cooke in Herb. Calcutt.;

Khandalla, 30th April 1883, Woodrow No. 2; Malabar Concan, etc., Stocks and Law in Herb. Ind. Or. Hook. f. et Thomson.

Central Provinces: Jubbulpore, flowers strong smelling, March 1901, Divl. Forest Officer in Herb. Calcutt. No. 62; without precise locality, ex Herb. Beddome in Herb. Mus. Brit.

Madras: N. Circars, Surada, Honble. W. Elliot sine no. in Herb. Calcutt.; without precise locality, Herb. Wight No. 1335; Chattrapur, Collector's Compound, March 1850, ex Herb. H. F. C. Cleghorn, Honble. W. Elliot, W. et A. No. 1238.

Behar and Orissa: Bettiah, baum in dem Gebirgswalde, alt. 4000 ft., Pater Hieronymus No. 400; Hazaribagh, alt. 2000 ft., April 1908, Meebold No. 5465; Hazaribagh, bridge north of, on Barhi road, March, 1878, Dr. J. J. Wood No. 62; Parasnath, alt. 3000 ft., 8th April 1871, C. B. Clarke No. 14082B; Parasnath, alt. 3500 ft., 9th April 1871, C. B. Clarke No. 14095B and c; Manbhum, Pokhuria, Rev. J. Campbell No. 7542; and 20th April 1885, No. 9283; Singbhum, March 1900, H. H. Haines No. 6; Palamaon, February 1878, J. J. Wood sine no. in Herb. Calcutt.

Bengal and Sikkim: Jahanabad, Poorshooro outpost, 9th March 1902, J. D. Nusker No. 1; Berhampore, "*Rondeletia exserta*" in Herb. Calcutt.; Darjeeling, Choklong, April 1873, J. S. Gamble No. 3717A; Panchkila, alt. 1000 ft., March 1880, J. S. Gamble No. 7995; Kurseong, May 1915, E. A. C. Modder No. 121.

NEPAL.—Without precise locality, May 1821, Wall. Cat. 6268; In sylvis Nepalis inferioribus, "*Bertiera Tilia*," Buch.-Hamilton No. 669, pro parte.

Roxburgh in 1814 described *Rondeletia exserta*: "A native of the interior parts of Bengal and particularly over the ruins of the ancient city of Gour; M. Henry Creighton found it there and sent plants to the Botanic Garden at Calcutta, where they thrive luxuriantly and blossom in March, at which period they form one of its greatest ornaments."

Dr. Benjamin Heyne, a medical officer of the East India Company—"vir maxime venerandus"—sent to Dr. Roth, who thus describes him, part of the large collections he had made, during a period of over twenty years, when he explored great parts of India, penetrating even to Tibet in 1814. From this collection Dr. Roth at Bremen in 1821 described two new species, *Rondeletia orissensis* and *R. thyrsoiflora*. Two years earlier Roemer and Schultes had published at Stuttgart another *Rondeletia*, *R. Heynei*, from the same collection. In 1820 Wallich described *R. cinerea*, from Nepal. It is undoubtedly the same species that was described by each of these authors and De Candolle in 1830 transferred them to the genus *Wendlandia* and reduced all but *Wendlandia cinerea* to *Wendlandia exserta*. Steudel in 1841 disposed of *W. cinerea*.

The outstanding characteristics of *W. exserta* are the short corolla

tube, only slightly exceeding the reflexed corolla lobes, the exerted stamens with linear anthers, the reflexed stipules and the tomentose undersides of the leaves. The flowers are usually densely fascicled. There is some variation in the length of the corolla tube as compared with the calyx; in the arrangement of the flowers, which are in some specimens more definitely fasciculate than in others; and the tip of the reflexed stipule may be more or less pointed, it is never, however, cuspidate, as in *W. tinctoria* DC. and its allies. None of these differences are pronounced enough to justify altering the synonymy of the Flora of British India. The type of the species *W. exserta* is Wall. Cat. No. 6267A, of which there is one sheet only, in the Wallich Herbarium, ex Herb. Roxburgh. The specimens under Wall. Cat Nos. 6267 c, d, e and f, the bottom left hand specimen only, and No. 6268 (*R. cinerea*) are also this species.

8. *Wendlandia Wallichii* Wight et Arnott Prod. i (1834), p. 402 in note; Steud. Nom. Bot. (1841), p. 786; Hook f. in Flor. Brit. Ind. iii (1882), p. 38; Brandis Ind. Trees (1906), p. 373; Wall. Cat. 6269B, pro parte.

INDIA.—Bengal and Sikkim: Sikkim, without precise locality, alt. 4000 ft., 28th October 1872, G. King No. 225A; Sikkim, without precise locality, alt. 3000 ft., 5th October 1872, No. 225B in Herb. G. King; Sikkim, without precise locality, S. Kurz in Herb. Sulp. Kurz ex Herb. Calcutt.; Sikkim, without precise locality, alt. 2000 ft., J. D. Hooker in Herb. Ind. Or. Hook. f. et Thomson; Sikkim, Dikeeling, alt 5000 ft., 21st October 1869, small tree, flowers white, C. B. Clarke No. 9655A; Sikkim, Namchi, October 1875, G. King; Sikkim, Ichompong, alt. 5000 ft., 19th October 1875, C. B. Clarke No. 25421C; Darjeeling and District, above Pankabaree, alt. 1800 ft., 30th August 1878, G. King No. 4050; Darjeeling, Singari Pahar, 17th February 1876, J. S. Gamble No. 437; Darjeeling, Ging, alt. 5500 ft., October 1879, J. S. Gamble No. 7187; Darjeeling, Lebong, alt. 5000 ft., 5th December 1877, Dungboo in Herb. Calcutt.; Rinkinpung, alt. 4000 ft., 13th November 1875, J. S. Gamble Nos. 231A, 231B, 231C, 231D, 231F, 231G; Kalimpong, alt. 4000 ft., October 1904, H. H. Haines B.B. 1000; Kalimpong, Lish Block, alt. 3000 ft., 23rd February, 1923, J. M. Cowan Nos. 5058 and 5078.

Assam: Chirra, 12th October 1835, Herb. Griffith Kew Distrib. No. 2834; Chirra, alt. 4000 ft. 7th October 1867, C. B. Clarke No. 5648; Shillong, Khasia, alt. 4500 ft., 14th October 1867, C. B. Clarke No. 5841; Mausmai, alt. 4000 ft., 18th October 1886, C. B. Clarke Nos. 45934A and 45934B; Shillong, Khasia Hills, alt. 4000 ft., August 1890, H. Collett No. 86 and November 1890, sine no.; Shillong, Bishop's Falls, alt. 4250 ft., 30th December 1885, C. B. Clarke No. 42589c; Khasia Hills, alt. 4-5000 ft., November 1877, No. 598, in Herb. Calcutt.;

same locality, Fielding in Herb. Kew., and alt. 4000 ft., November 1890, D. Robertson in Herb. Calcutt.; a small tree, 5th April 1894, G. A. Gammie No. 356, alt. 1-4000 ft., J. D. Hook. et T. Thomson in Herb. Calcutt.; and Griffith No. 299; and Kurz No. 376; Khasia, Cherrapunji, alt. 4000 ft., July 1872, G. Gellately No. 387; without precise locality, Thos. Lobb in Herb. Kew.; Khasia, 22nd mile Cherra road, on landslips, alt. 6000 ft., flowers white, odorous, 8th October 1914, Upendranath Kanjilal No. 4495; Khasia, Noksnghiang, 2nd October 1911, R. K. Das No. 35599; Sylhet, Wall. Cat. No. 6269B (type), 6269 pro parte; Manipur, Myang Khong, alt. 6000 ft., 14th February 1882, G. Watt No. 6043; Kohima, Chanbhari, alt. 5000 ft., October, G. Mann in Herb. Calcutt.; Kohima, alt. 5000 ft., arborescent shrub of 15 ft., 21st October 1885, C.B. Clarke Nos. 41115A and 41115B; Kohima, July 1886, Dr. D. Prain, in Herb. Calcutt.; Abor Hills, junction of the Yamne and Dehong, small tree on rocks near the rivers, alt. 600 ft., 21st January 1912, J. H. Burkill No. 36148; Balek, 18th January 1912, J. H. Burkill No. 36434; Rengging 28th February 1912, J. H. Burkill No. 36728; Janakmukh, 14th December 1911, J. H. Burkill No. 37141.

Lushai Hills: Champhai, alt. 5000 ft., 25th October 1927, Mrs. N. E. Parry No. 354.

BHUTAN.—Yung, alt. 6000 ft., shrub 15-16 ft., 19th November 1875, G. King; without precise locality, 1885, J. Parkes in Herb. Calcutt.

In a note in the *Prodromus Flor. Insulae Orientalis* i, 402, Wight and Arnott point out that the plant under the name *W. tinctoria* Roxb. and the number 6269B in Wallich's Catalogue, has the anthers too much exerted to be the true plant and they state, without adding a description, "we propose to call it *Wendlandia Wallichii*."

This remark can refer only to the very poor specimen on the right-hand corner of the sheet of that number in the Wallich Herbarium. There is, however, another sheet of the same plant in the general Herbarium at Kew and one in Calcutta under this number. These sheets are type and co-types, and the plant was first collected at Sylhet in Assam.

The species has a restricted distribution, but is now known to occur in Sikkim, Assam and in the Lushai Hills. It was first described by Hooker in the *Flora of British India*. Here he puts it next to *W. puberula*, a North-West Indian species with which it is obviously closely allied. The flowers of *W. Wallichii* are smaller than those of *W. puberula*, being intermediate in size between those of *W. puberula* and *W. exserta*. In *W. Wallichii* the calyx is quite glabrous, the corolla lobes are shorter than the tube, the stigma is V-shaped whereas in *W. puberula* it is U-shaped. The stipules are ovate and reflexed as in *W. exserta* and not pointed and erect as in *W. puberula*, they are,

moreover, very early deciduous, and frequently missing on dried specimens.

The leaves are elliptic-lanceolate, 8-16 cms. long, 4-16 cms. wide, acuminate at both ends, minutely puberulous to almost glabrous both above and below.

8a. Var. *pedicellata* Cowan. Var. nov.

A typo panicula laxiore, floribus plerumque pedunculatis differt.

INDIA.—Assam: Kohima, alt. 4000 ft., corolla white, 2nd November 1885, C. B. Clarke No. 41525 (type).

C. B. Clarke notes on his sheet "The stipules and calyx teeth are exactly as in *W. Wallichii* W. et A. and I think it must be a 'laxiflora' state of that." In determining the plant, apparently at a later date, he seems to have overlooked his original note and has called it *W. Notoniana* Wall. var. *zeylanica* Hook. f., with which it has no affinity. The plant is undoubtedly very near *W. Wallichii* W. et A. with a more lax panicle than the type, and for the most part shortly pedicellate flowers. The anthers are slightly shorter and less exerted than in typical *W. Wallichii* W. et A., and this character may have caused it to be confused with the Ceylon plant.

9. *Wendlandia speciosa* Cowan. Sp. nov.

Affinis *Wendlandiae ligustrinae* Wall. sed corolla longiore, stipulis appendice parva foliacea reflexa ornatis inter alia distincta.

Arbor vel frutex dumetorum circa 7-10 m. altus, ramulis junioribus puberulis brunneo-flavidis. Folia opposita coriacea late ovata subaequalia, integra, 7-16 cm. longa, 4.5-9 cm. lata, apice plus minusve abrupte acuta, in basin angustata glabra vel supra sparsissime et brevissime pilosa, subtus glabra nervis pilis canis brevibus sparsim obscureque vestitis exceptis. Stipulae interpetiolares 4 mm. longae, apice in foliolum orbiculare expansae. Inflorescentia terminalis; panicula repanda, pubescens, bracteis linearibus, floribus suaveolentibus albidolutescentibus brevissime pedunculatis, 9-10 mm. longis. Calyx pilis canis sparsim tectus, lobis lanceolatis acutis receptaculum aequantibus. Corollae 5-fidae tubus intus pilosus, lobis ovatis rotundatis triplo longior. Stamina 5 antheris exertis lanceolatis vel lineari-lanceolatis basi bifidis. Stylus prominens pilis passim constrictus, stigmatibus bilobis exstante.

INDIA.—Upper Burma: Nureng, alt. 2800 ft., January 1912, S. M. Toppin No. 6201.

CHINA.—Yunnan: Hills to the North-West of Tengueh, lat. 25° 10' N., alt. 7-8000 ft., shrub of 20-30 feet, flowers yellowish-white, fragrant, open situations in thickets, November 1912, G. Forrest No. 9269 (type).

9a. Var. **Forrestii** Cowan. Var. nov.

A typo panicula conferta, floribus minoribus ad 6-7 mm. tantum attingentibus differt.

CHINA.—Yunnan: West of Tengyueh, lat. 25° N., alt. 5000 ft., tree of 25-40 ft., flowers greenish-white, open mixed forests, May 1912, G. Forrest No. 7475; divide between the Shweli and Tengyueh valleys, lat. 25° N., alt. 6-7000 ft., shrub of 6-15 ft. high in fruit, amongst scrub, May 1912, G. Forrest No. 7884; flanks of the Mingkwong valley, lat. 25° 15' N., alt. 6-7000 ft., shrub 8-15 ft. high in fruit, amongst scrub and in thickets, June 1912, G. Forrest No. 8255; hills between the Shweli and Tengyueh valleys, lat. 25° N., alt. 7000 ft., shrub of 12-20 ft., flowers creamy-white, fragrant, open situations in thickets, December 1912, G. Forrest No. 9397; hills to the north-west of Tengyueh, lat. 25° 10' N., alt. 6000 ft., shrub of 20 ft., flowers creamy-white, fragrant, in open thickets, February 1913, G. Forrest No. 9552; hills to the west of Tengyueh, lat. 25° N., alt. 7000 ft., shrub of 20-30 ft. high, flowers creamy-yellow, fragrant, in thickets, March 1913, G. Forrest No. 9806; Shweli-Salwin divide, lat. 25° 30' N., alt. 8000 ft., shrub of 10-15 ft. in height (in fruit), in open rocky situations, on the margins of mixed forests, December 1913, G. Forrest No. 12108; Mekong-Salwin divide, lat. 26° 20' N., alt. 9-10,000 ft., shrub of 10-12 ft. high in fruit, in open thickets and by streams in side valleys, July 1919, G. Forrest No. 18294; on the hills north-west of Tengyueh, lat. 25° 21' N., long. 98° 30' E, alt. 7000 ft., shrub of 20-35 ft. high, flowers pure waxy white, fragrant, in thickets in side valleys, November 1924, G. Forrest No. 25379. "Note.—Not an attractive tree though the flowers are good. Rather leggy and unkempt with foliage congested on the ends of the branches.—G.F." In fruit, same locality and altitude, G. Forrest No. 26148.

W. speciosa, one of the largest flowered Wendlandias, is easily distinguished from *W. ligustrina* Wall, by its rounded reflexed stipules and larger ovate leaves. From other species it can at once be separated by its sparsely hairy style. This magnificent species was first found by Toppin in Upper Burma, but in the same year it was collected by Forrest in Yunnan and is apparently very common about Tengyueh. It occurs at elevations of from 6000 to 10000 ft. The variety differs by having distinctly smaller and more widely infundibular flowers.

10. **Wendlandia appendiculata** Wall. MS. (nom. nudum) descript. Cowan.

Wendlandia puberula Hook. f. in Flor. Brit. Ind. iii (1882), p. 38, pro parte, non DC.

Rondeletia appendiculata Wall MS. (1821).

Species haec ab *Wendlandia puberula* DC. stipulis apice rotundatis reflexis, calycis lobis longioribus, foliorum forma clare differt; ab

Wendlandia paniculata DC. antheris linearibus vel lineari-oblongis valde exsertis inter alia recedit.

Arbuscula vel arbor ramulis crassis sulcatis puberulis junioribus brunnescentibus. Folia opposita coriacea oblanceolata vel anguste obovata 11-16 cm. longa, 3-6 cm. lata, apice breviter acuminata, ad basin sensim attenuata, supra glabra, costa valde impressa, subtus breviter sparsimque strigosa, costa nervisque prominentibus. Petiolus robustus circa 2 cm. longus glaber. Stipulae interpetiolares orbiculares brevistipitatae demum reflexae. Inflorescentia repanda circa 10-15 cm. longa, ad 25 cm. lata, floribus sessilibus glomeratis, bracteis receptaculo dimidio longioribus. Receptaculum pilosum calycis lobos parce et longe hirsutos triangulares aequans. Corolla 4 mm. longa apud os paulum repanda, intus glabra; stamina distincte exserta, antheris longe linearibus. Stylus bilobus tubo corollae manifeste projectus.

NEPAL.—Makoll? April 1821, in flower, Wall. Cat. No. 6270, pro parte (type).

Hooker, in a note on the type sheet of this plant in the Wallich Herbarium No. 6270 pro parte, (No. 58, page 311) pointed out that it has the stipules of *Wendlandia paniculata* DC. and the flowers of *W. puberula* DC. The foliage most nearly resembles that of *W. coriacea* DC. Although it is included with *W. puberula* in the Flora of British India *Wendlandia appendiculata* Wall. may be easily distinguished from that species by its orbicular reflexed and not cuspidate stipules and by its coriaceous, elliptic to oblong leaves. The stipules and the hairy (not glabrous) receptacle are characters which at once separate *W. appendiculata* Wall. from *W. coriacea* DC. and *W. Gamblei* Cowan.

SERIES II—SUBINCLUSAE.

In this series the anthers are sessile or nearly sessile and are borne on very short filaments which arise between the corolla lobes. The filament is shorter than the anther itself. When the flowers are fully developed the anthers become exserted from the corolla tube by the bending of their short filaments, but they remain close to the tube and are not carried away from it. The shape of the anthers is usually elliptic to ovoid; in three species, *W. coriacea* DC., *W. Gamblei* Cowan, and *W. Heyneana* Wall., they are oblong-linear. With these exceptions the anthers are less than twice as long as broad. The stigma is bifid. The series is divided into two sub-series, the Tinctoriae with cuspidate and erect stipules, and the Paniculatae in which the stipules are rounded and reflexed.

The species within both sub-series are very closely allied to each other and individual characters are so subject to intergradation that it is often difficult to define clearly the limits of a single species. The keys given below should therefore be used with caution.

I. SUB-SERIES TINCTORIAE.

The sub-series Tinctoriae represents a complex group of species which have a distinct tendency to merge into each other, although extreme forms in closely connected groups are distinct enough. The members of the series have apparently arisen from related stocks and the process of segregation is not yet complete.

The species of the sub-series have a geographical range extending from India to the East Indian Archipelago and to China. Although there is a certain similarity among all the members of the sub-series, they differ as regards the relative size of their floral organs, the degree of pubescence, particularly on the calyx, in the form of the calyx, and in the size, shape and texture of their leaves. These variations have been discussed in the preceding pages, and when small and spread over several characters, the species become difficult to separate. There is a good deal of overlapping, and differences of opinion as to where dividing lines should be drawn are bound to arise. In deciding these points the following facts are important.

From species with a hairy receptacle, represented by *W. tinctoria* DC., there is a complete series of intermediate gradations to species with a glabrous receptacle, represented by *W. glabrata* DC. from Java. It has, in fact, been suggested that the species *W. glabrata* DC. should be reduced to *W. tinctoria* DC. To do this, however, would not solve the problems. The tendency in the past happens to have been to segregate the nearest allies of *W. tinctoria* DC. with hirsute calyces as distinct species, while, on the contrary, no matter the structure of their flowers and their geographical range, those with glabrous calyces have usually been united with the relatively distinct Javanese plant *W. glabrata* DC.

In the arrangement now adopted, after a careful review of the whole sub-series, an attempt has been made to arrange the species according to their relationships to each other, giving each an equal value. Due consideration has been given to geographical distribution. The following notes draw attention to the main characteristics by which the various species can be differentiated.

From all other members of this group, three species, *W. angustifolia* W. et A., *W. ternifolia* Cowan, and *W. thyrsoides* Steud. can be readily distinguished by their leaves being normally in whorls of three.

Wendlandia coriacea DC. and *W. Gamblei* Cowan, are readily distinguished by their oblong-linear anthers.

The two Indo-Chinese species *W. ferruginea* and *W. Thorelii*, the types of which I have examined, have been placed in the key according to Pitard's description. It has been necessary to follow him since, from the material, it is impossible to form any opinion as to the structure of the flowers. Pitard classifies both as having the corolla tube equalled by the length of the lobes, a character which separates

them from other members of the group. There is little doubt that both species belong to this sub-series but the exceptional corolla may belong only to juvenile flowers. A similar corolla form may be observed in undeveloped flowers of other species within the series. The figure of *W. ferruginea* in the Flore Générale de l'Indo-Chine (iii, p. 59 t. 6, f. 10), with exceptionally large anthers relative to the other parts of the flower, resembles, in fact, the immature flowers of allied species and those on Pierre's type are very young. These Indo-China species with glabrous receptacles will therefore require re-examination when further material becomes available.

With regard to the species that remain to be discussed, starting with *W. tinctoria* DC. with a tubular corolla, small ovoid anthers, a hairy receptacle and a cuspidate stipule, we may consider how the others differ from it.

W. grandis Cowan from northern Bengal has a much larger corolla tube, its stipules are furnished with a long flattened, pointed, ligulate tip, and its leaves are larger and more broadly ovate than are those of *W. tinctoria* DC.

The type sheet of *W. Cavaleriei* Lévl., a Kouy Tcheou species shows it to have a shorter corolla than *W. tinctoria* DC. A few hairs are sometimes found on the outside of the corolla tube, and the calyx lobes are distinctly longer in relation to the receptacle than they are in typical *W. tinctoria* DC. Both *W. grandis* and *W. Cavaleriei* agree with *W. tinctoria* in having a hirsute calyx.

Turning now to forms from different geographical areas which more closely resemble the true *W. tinctoria* DC., and are here regarded as sub-species, the following points may be noticed.

The sub-species *cinnamomea* from Central India has a sparsely pubescent calyx and also differs from typical *W. tinctoria* in the texture of its leaf and by having hirsute stipules.

The sub-species *Handelii* from Yunnan, has a very much shorter corolla tube than that of the flower of the true *W. tinctoria*, and at the same time the tube is much wider in proportion to its length. The receptacle is pubescent and the sub-species differs in leaf. Sub-species *floribunda* from Siam and *barbata* from China are unique in having hairs on the exterior of the corolla lobes, forming a tuft at the apex of the flower bud and the calyx is glabrous or nearly so. How far these characters are constant on different specimens taken from the same tree, or from trees growing in different environments, or with varying age there are no data to show.

The sub-species *orientalis* from Burma and Siam is practically *W. tinctoria* DC. with a glabrous receptacle. I have removed these plants from "*W. glabrata*," since these and all the sub-species of *W. tinctoria* differ from the Javanese plant in the shape of their corolla.

Species with a glabrous receptacle which differ from *W. tinctoria* in other characters also, and have been kept distinct, are as follows :—

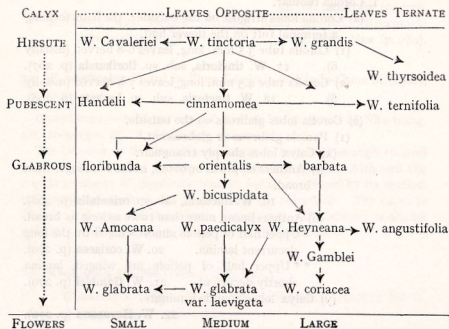
W. Heyneana Wall., a South Indian species, has larger flowers than *W. tinctoria* DC. and has minute rounded calyx lobes. It differs from *W. glabrata* DC. of Java which has acute triangular calyx lobes. In the latter the panicle is puberulous, in the former the plant is entirely glabrous. The true *W. glabrata* DC. is distinguished from *W. tinctoria* by its broader, less dense, but more spreading panicle. Its glabrous receptacle, leaves and stipules are also features to be noted.

W. bicuspidata W. et A. from Ceylon (not happily named, for the stipules are often pointed—and bifid stipules are also found, though rarely, in *W. tinctoria* DC.), has flowers of about the same length as those of *W. tinctoria* but wider. The receptacle in this species is again glabrous and the leaves are characteristic. Its calyx lobes readily distinguish it from *W. Heyneana* Wall.

The Philippine Island plant *W. Warburgii* Merr. has, from the description, a much shorter panicle than *W. tinctoria* DC.

In *W. paedicalyx* Pitard from Indo-China the calyx teeth are long and spatulate—a unique feature. Both *W. Amocana* Cowan from Chittagong and the true *W. glabrata* DC. differ from *W. tinctoria* DC. in their distinctly infundibular or trumpet-shaped flowers, those of *W. tinctoria* are tubular. The corolla in both cases is short and the calyces are glabrous. These two species are closely related to each other, and differ chiefly in the arrangement of their flowers.

In order to summarise the salient points which are of necessity somewhat involved the following diagram has been prepared. It may at the same time serve to indicate in a very general way the inter-relationship of the various species.



Key to the Species.

A. Leaves usually opposite.

a. Calyx lobes spatulate.

11. *W. paedicalyx* (p. 261).

b. Calyx lobes not spatulate.

i. Corolla tube at least twice the length of the corolla lobes.

x. Receptacle and calyx lobes hairy or pubescent.

i. Stipules with a ligulate tip longer than the stipular base.
Calyx lobes as long as the receptacle.12. *W. grandis* (p. 261).

ii. Stipules cuspidate, the tip not longer than the base.

(a) Calyx lobes as long as the receptacle. Corolla tube
sometimes hairy on the outside.13. *W. Cavalieriei* (p. 263).(b) Calyx lobes shorter than the receptacle. Corolla tube
always glabrous without.

(1) Receptacle sparsely pubescent.

(x) Stipules hirsute.

15. *W. tinctoria*, sub. sp. *cinnamomea* (p. 266).

(y) Stipules glabrescent.

16. *W. tinctoria*, sub. sp. *Handelii* (p. 267).(2) Receptacle densely hairy. 14. *W. tinctoria* (p. 264).y. Receptacle glabrous, calyx lobes glabrous or with a few
hairs (Nos. 17, 18).

i. Corolla tubular.

(a) Corolla lobes strigose on the outside: the hairs forming
a terminal tuft on the flower bud.(1) Corolla tube 3.5 mm. long, leaves 6-8 nerved (usually
6). 17. *W. tinctoria*, sub. sp. *floribunda* (p. 267).(2) Corolla tube 4.5 mm. long, leaves 7-9 nerved (usually
8). 18. *W. tinctoria*, sub. sp. *barbata* (p. 268).

(b) Corolla lobes glabrous on the outside.

(1) Panicle glabrous or glabrescent.

(x) Calyx lobes sharply triangular.

(i) Anthers elliptical or ovoid, not much longer than
broad.19. *W. tinctoria*, sub. sp. *orientalis* (p. 268).

(ii) Anthers linear, more than twice as long as broad.

* Upper half of petiole almost winged by the long
decurent lamina. 20. *W. coriacea* (p. 270).** Upper half of petiole not winged, lamina
shortly decurent. 21. *W. Gamblei* (p. 270).

(y) Calyx lobes rounded, minute.

22. *W. Heyneana* (p. 272).

- (2) Panicle pubescent.
 (x) Panicle short, about 3 cm. in length.
 23 *W. Warburgii* (p. 273).
 (y) Panicle spreading, exceeding 3 cm. in length.
 (i) Corolla glabrous at the mouth.
 * Corolla tube 4 mm. long or less.
 24. *W. bicuspidata* (p. 273).
 ** Corolla tube 5 mm. long or more.
 25. *W. philippinensis* (p. 274).
 (ii) Corolla hairy at the mouth.
 26a. *W. glabrata*, var. *laevigata* (p. 277).
 ii. Corolla short and infundibular.
 (a) Flowers shortly stalked, usually single.
 26. *W. glabrata* (p. 275).
 (b) Flowers sessile, mostly in groups of three.
 27. *W. Amocana* (p. 277).
 2. Corolla tube the same length as the lobes.
 x. Corolla rotate. 28. *W. ferruginea* (p. 278).
 y. Corolla tubular. 29. *W. Thorelii* (p. 278).

B. Leaves usually ternately whorled.

- a. Leaves linear-lanceolate, receptacle glabrous.
 30. *W. angustifolia* (p. 279).
 b. Leaves ovate to elliptic lanceolate.
 i. Leaves glabrous beneath, receptacle glabrescent.
 31. *W. ternifolia* (p. 279).
 2. Leaves with longish scattered hairs beneath. Receptacle
 pubescent or hairy. 32. *W. thyrsoidea* (p. 280).

11. *W. paedicalyx* Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 65.

INDO-CHINA.—Annam: massif de Hon-ba, province de Nha-trang, alt. 1000-1500 m., A. Chevalier, sine no.

The Director of the Paris Herbarium has been kind enough to send me a small portion of the type of this distinct species. Although the corolla is absent *W. paedicalyx* can be easily recognised by its spathulate calyx lobes which are longer than the receptacle. The calyx is entirely glabrous and the stipules are pointed. The affinity is almost certainly with the glabrous forms of *W. tinctoria* DC.

12. *Wendlandia grandis* Cowan. Sp. nov.

Wendlandia exserta (Roxb.) DC. var. *grandis* Hook. f. MS. E.
 Sylhet. Wall. Cat. 6269a.

Wendlandia budleoides Wall. MS. in Wight et Arn. Prod. i (1834), p. 402.

Wendlandia tinctoria DC. var. *grandis* Hook. f. in Flor. Brit. Ind. iii (1882), p. 38.

Arbor ad 14 m. alta trunco 1 m. ambitu, ramulis junioribus pallido-brunneis sulcatis glabrescentibus. Folia coriacea nitida ovata vel ovato-elliptica supra glabra costa impressa subtus tantum ad nervos plus minusve breviterque hirsuta, 10-18 cm. longa 5-10 cm. lata, abrupte brevi-acuminata basi cuneata, in petiolum glabrum 2-3 cm. longum attenuata. Stipulae interpetiolares triangulares erectae appendice praelonga complanata ornatae. Inflorescentia repanda pubescens, floribus sessilibus fasciculatis; corollae tubus gracilis circa 5 mm. longus, intus medium versus pilosus, lobis ovatis fere octuplo longior. Calyx dense pubescens, lobis obtuse triangularibus receptaculum paene aequantibus. Antherae ovatae, filamentis brevissimis. Stylus bifidus paulum exsertus.

INDIA.—Sikkim and Bengal: Darjeeling District, Teesta Valley, May 1874, J. S. Gamble No. 3721B; Teesta Valley, February 1882, J. S. Gamble No. 10259; Teesta Valley, 20th February 1867, T. Anderson; Sikkim, without precise locality, Herb. Griffith, Kew Distrib. No. 2833; Great Rungeet, alt. 2-4000 ft., April 1850, J. D. Hooker; Rungeet, alt. 2000 ft., 11th March 1876, C. B. Clarke No. 27249D; Mungpoo, alt. 3000 ft., February 1877, J. S. Gamble No. 3102B and No. 3102E; Rungirum, alt. 6000 ft., 12th March 1923, Cave sine no.; Darjeeling Terai, E. A. C. Modder No. 375K; Damdim; Jalpaiguri Duars, March 1893, H. H. Haines No. 330; Rishap, alt. 1500 ft., 3rd March 1871, C. B. Clarke No. 13919; Jalpaiguri, Gorumara, 5th March 1903, J. H. Lace No. 2663; Kalimpong, March 1922, J. M. Cowan No. 506S.

E. Bengal: Chittagong, Hill tracts, Kasalong and Barkal, 27th February 1876, J. L. Lister No. 88.

Assam: without precise locality, Griffith No. 2117; Garo Hills, Shambram, 1874, W. Shakespear No. 79; Garo Hills, shrub very common, March, 1879, W. R. Fisher No. 1; Garo Hills, Rangmachokgiri, tree 45 feet high, 35 inches in girth, stem irregular, bark greyish-brown on branches, corky and with fine parallel longitudinal fissures, 28th February 1915, vern. *Bol Borak*. Upendranath Kanijjal No. 5175; Gauhati, low hills, January 1851, No. 679 in Herb. Calcutt.; Khasia, alt. 3000 ft., Nya? Bungalow, shrub of 6 ft., 5th April, 1886, C. B. Clarke No. 43323; Mont Khasia, alt. 1-4000 ft., J. D. Hooker et T. Thomson, in Herb. Calcutt.; Shillong, Jowai Road, March 1872, D. Prain in Herb. Calcutt.; Sylhet, Wall. Cat. 6266A, the lower specimen only, No. 6266B, the upper specimen only (type); Sylhet, Wall. Cat. No. 6269A; Akha Hills, Daffla Hill, January, Dr. King's Collector, Badul Khan No. 31 and February No. 123; Duphla Hills, Borphan, 16th February 1875, J. L. Lister No.

344; Sibsagar, Galaghat, February 1891, G. Mann in Herb. Calcutt.; Sibsagar, Sapakati, alt. 250 ft., tree 30 ft., 20th April 1885, C. B. Clarke No. 37988c; Sibsagar, between Sepakati and Sonari, tree, 35 feet high, 28 inches girth, 24th February 1914, Upendranath Kanjilal No. 3490; Sibsagar, Nazira, 18th March 1875, G. Watt No. 10376; Sibsagar, Methanchowa, Hakrabaree, 8th March 1897, collected by the reporter on Economic Products No. 12405; Sibsagar vern. *Bam Kodam*, 1891, S. E. Peal No. 357 and No. 372; Jalabustee near Dalanuddy, February 1899, Dr. Prain's collector No. 763; Makum, Dihing River, 16th March 1894, G. A. Gammie No. 9; Nurklur, March 1850, Mr. Simons No. 164; Dibrughur, November 1865? No. 1080 sine coll. in Herb. Calcutt.; Naga Hills, No. 269 sine coll. in Herb. Calcutt.; Naga Hills, March 1882, M. Fortermann; Naga Hills, Piphema, alt. 2000 ft., 1st March 1882, H. Collett No. 161; without precise locality, Master in Herb. Ind. Or. Hook. f. et Thomson; without precise locality in Herb. Calcutt.

Lushai: 7 miles from Changsie, 6th April 1890, tree 30 feet, flowers white, J. C. Prazer sine no.; Chinchup, flowers fragrant, alt. 4000 ft., January 1928, Mrs. N. E. Parry No. 601.

BHUTAN.—Without precise locality, 1898, Mokim, in Herb. Calcutt.; without precise locality, Griffith No. 814.

UPPER BURMA.—Maraohka, February 1912, S. M. Toppin No. 4424.

A species easily distinguished from *W. tinctoria* by its longer flowers, much larger leaves, and stipules which, instead of having a short cuspidate point, have a long flattened appendage.

13. *Wendlandia Cavalieriei* Lévl. in Fedde, Repert. Nov. Spec. x (1912), p. 434; Flor. du Kouy Tcheou (1914-15), p. 373.

Wendlandia Feddei Lévl. in Fedde, l.c., p. 434; Flor. du Kouy Tcheou, p. 373.

CHINA.—Kouy Tcheou: Lo-fou, fleur blanche, April 1907, J. Cavalierie No. 3297 (type); Route Pin-fa à Lo-fou, 4th April 1906, J. Cavalierie No. 2732; Kouy Tcheou, alt. 7-800 m., coteaux arides à Euroly, etc., February 1913, Joseph Esquirol No. 2537.

This species is very closely allied to *W. tinctoria* DC, but it may be distinguished from it by its shorter corolla tube and long calyx lobes exceeding the length of the receptacle. It will not be confused with *W. tinctoria* sub-sp. *floribunda*, which has a glabrous receptacle. The two species which I have here united were separated by Léveillé on account of the presence of hairs on the corolla tube of *W. Feddei*. This character is not constant. External hairs may be found in his *W. Cavalieriei*, and are absent from some of the flowers on the type sheet of *W. Feddei*. Hairs are also occasionally present on the corolla lobes on both the upper and lower surfaces. They seem to occur principally on the younger flowers, and are not so plentiful as in the

sub-species *floribunda* where the flower buds are crowned with an apical tuft.

In this species it is only in the juvenile state that the stamens and style are included in the corolla tube and Léveillé's statement in his description of *W. Feddei* requires modification in this respect.

14. *Wendlandia tinctoria* (Roxb.), DC. Prod. iv (1830), p. 411; Don, Gen. Syst. iii (1834), p. 518; Wight et Arn. i (1834), p. 402 (note); Steud. Nom. Bot. (1841), p. 786; Kurz, For. Flor. Burm. ii (1877), p. 74, pro parte; Duthie, Flor. Upper Gangetic Plain i, Part ii (1905), p. 418; Haines Bot. Behar and Orissa part iv (1922), p. 426; Brandis Ind. Trees (1906), p. 374, pro parte; Flor. Chota Nagpur (1910), p. 499.

**Wendlandia tinctoria* DC. var. *normalis* Hook. f. in Flor. Brit. Ind. iii (1872), p. 38.

Wendlandia nitens Wall. Cat. 6271 pro parte; Don, l.c., p. 518; Steud., l.c., p. 786; Miq. Flor. Ind. Batav. ii (1860), p. 347, non Hook. f.

Rondeletia tinctoria Roxb. Hort. Bengal (1814) 15 et Flor. Ind. ed. Carey ii (1824), p. 134; Wall. Cat. 6266B pro parte (the lower specimen only), 6267F (the top left specimen only).

?*Bertierra Tilia* Buch.-Ham. ex Wall. Cat. 6269 D, pro parte.

INDIA.—N.W. India: Without precise locality, H. Royle in Herb. Kew:

United Provinces: Oudh, 1870, R. Thompson, Comm. Dr. Brandis in Herb. Kew; Dinila, 18th March 1809, *Bertierra Tilia*, F. Buchanan-Hamilton No. 668 (3); Patinatola, 27th January 1808, F. Buchanan-Hamilton No. 668 (1).

Central India: Jubbulpore, sine coll. sine no. in Herb. Calcutt.

Behar and Orissa: Manbhum, 188-, Rev. J. Campbell in Herb. Calcutt.; Jashpur, alt. 1500-2000 ft., 1st December 1890, J. J. Wood No. 103; Singbhum, near Bandgaon, December 1880, J. S. Gamble No. 8946; Singbhum Forests, alt. 800 ft., 20th February 1902, J. H. Lace No. 2168; Singbhum, March 1899, H. H. Haines No. 7; Kolhan, Kurhutia, January 1881, J. S. Gamble No. 9155; Kolhan, Mailpir, January 1881, J. S. Gamble No. 9167; Hazaribagh, Bushee, February 1882, J. S. Gamble No. 10221; Hazaribagh, Mudhobum, alt. 1000 ft., 9th April 1884, C. B. Clarke No. 34625c; Biorampore, January 1903, Dr. Prain's Collector No. 17; Behar, alt. 2-4000 ft., J. Hooker, in Herb. Ind. Or. Hook. f. et Thomson. West Bengal, without precise locality, common in jungles, December 1866, S. Kurz in Herb. Calcutt.

* The above synonymy refers only to *W. tinctoria* DC proper.

Madras: Ganjam, Khaiguda, alt. 500 ft., January 1884, J. S. Gamble No. 13717.

Sikkim and Bengal: Sikkim, alt. 2-4000 ft., J. D. Hooker in Herb. Ind. Or. Hook. f. et Thomson.

E. Bengal: Chittagong, alt. 0-1000 ft., 3rd January 1851, J. D. Hooker et T. Thomson No. 355.

Assam: Khasi Hills, near Mawleng Keng, March 1918, H. G. Carter No. 749; Manipur, Mao, alt. 5000 ft., April 1882, G. Watt No. 7288; Naga Hills, Shibong, alt. 3000 ft., December 1907, A. E. Meebold No. 7479.

NEPAL.—Wall. Cat. No. 6270, pro parte, in Herb. Calcutt.

BHUTAN.—Herb. Nuttall, Both sine no.

BURMA.—Henzada, S. Myanaung Reserve, alt. 1500 ft., a small tree, flowers white, 10th January 1912, C. G. Rogers sine no.; North Tungoo, Saing Yene Reserve, 30th January 1929, Ba Pe No. 9325; Tungoo, Kayinchaung Reserve, alt. 800 ft., 22nd January 1927, Po Chin No. 4452; Tharrawaddy, Wé, 17th March 1925, C. E. Parkinson No. 622; Pegu, Yoma DOUNGMIE, *Eng Forests and Toukyaghat*, Forest Pagoda, S. Kurz No. 1414; Tenasserim District, Moulmein, Falconer No. 855 in Herb. Kew.; Amherst, Miba to Kyankket Thaugyin Valley, alt. 1000 ft., 8th February 1912, J. H. Lace No. 5677; Fort Stedman, December 1892, Abdul Huk sine no.; Attran River 27th March 1827, Wall. Cat. No. 6271 pro parte.

SIAM.—Wann Bao, alt. c. 400 m., a tree about 4 m. high, 20th February 1905, C. C. Hosseus No. 472.

Although I have not been able to trace with certainty Roxburgh's type, there can be little doubt about the identification of the true *W. tinctoria* (Roxb.) DC., which is the Bengal plant from Burdwan and Midnapore of which there is ample material, and Roxburgh's description is very complete. The species may be recognised by its oblong-lanceolate leaves, nearly glabrous above, sparingly hairy or glabrescent below, triangular stipules terminating in a cuspidate point, and small tubular flowers, which are not hairy on the corolla. The receptacle and calyx lobes are more or less densely covered with long hairs, the lobes are about equal in length to the receptacle or somewhat shorter.

14a. Var. **callitricha** Cowan. Var. nov.

A typo floribus densius fasciculatis, lobis calycis hirsutioribus distinguenda.

BURMA.—Myitkyina, on the way from Myitkyina to Pidaung Chg. alt. 500 ft., 18th February 1926, Sukoe No. 2314; Myitkyina, Nausonti Reserve, alt. 900 ft., March 1909, vern. *Thitni* or *Tamasank*, Buchanan No. 13; Myitkyina, Kachin Hills, 15th March 1897, E. Pottinger sine no.; Kachin Hills, 1898, Shaik Mokim sine no.; Valley of the

Taping, alt. 2000 ft., lat. 24° 30' N., a shrub of 4-10 ft., flowers white, fragrant, in open situations amongst scrub, February 1914, G. Forrester No. 12148; Katha, Mausi Division, 11th March 1929, Sukoe No. 9088; Mawlaik, alt. 500 ft., 28th February 1926, Po Chin No. 237; Kindat, Bellet Hills, 10th March 1891, J. Prazer sine no.; Maymyo, alt. 3500 ft., 12th March 1913, J. H. Lace No. 6128 (type); Southern Shan States, Monay, 1896, Abdul Khalil in Herb. Calcutt.; Laikaw, 1894, Abdul Khalil sine no.; and at Toungyi, 1894, Abdul Khali sine no.; Zi-gon, San gyi Baw, Bin Reserve, 3rd March 1930, Ba Pe No. 10760; Pegu, 22nd March 1871, in fruit, S. Kurz No. 3072; Rangoon, alt. 100 ft., 17th February 1914, A. Rodger No. 20; Amherst, Mepali Reserve, alt. 800 ft., 21st February 1910, Mg. Tha Myaing No. 33; Tenasserim? 4th February 1849, Falconer sine no.; Towards Meinkhoor? Herb. Griffith, Kew Distrib. No. 2835 pro parte.

CHINA.—Yunnan: Salwin Valley, lat. 25° 3' N., long. 98° 57' E., alt. 3-4000 ft., a shrub of 6-10 feet, flowers fragrant, white, amongst scrub on open dry slopes, February 1922, G. Forrester No. 21078; near Manpan, Red River Valley, alt. 2500 ft., A. Henry No. 10176 pro parte; Mi-lé District, A. Henry No. 10568.

In Burma, in addition to the true *W. tinctoria*, a form occurs in which the flowers are more fasciculate than in the type and the hairs on the panicle and on the calyx are longer and denser than in the typical plant, giving the inflorescence a somewhat more tomentose appearance. This form, which may be merely a variation due to local conditions of soil and situation, extends into Yunnan and is well represented in herbaria by the above specimens.

15. *Wendlandia tinctoria* DC. sub-sp. *cinnamomea* Cowan. Sub-sp. nov.

Bertiera Tilia Buch.-Ham. ex Wall. Cat. 6269d pro parte.

A typo *Wendlandiae tinctoriae* DC. receptaculo lobisque calycis puberulis nec hirsutis, foliis subtus in sicco cinnamomeis differt; caeterum cum typo congruit.

INDIA.—Deccan: Kurnool District, Mantialahanama, alt. 2000 ft., February 1887, J. S. Gamble No. 18727 (type); Nugger Hills perhaps? Wight in Herb. Kew.; Sukanagur, 17th March 1810, Wall. Cat. 6269d pro parte and Buch.-Ham. No. 668 (2); Nawabganj, 22nd February 1802, Wall. Cat. No. 6269d, pro parte.

This sub-species, although very closely allied to *W. tinctoria* DC., can be distinguished from it by its pubescent calyx and brownish leaves, when dried. I have taken as the type, Gamble's No. 18727 from Kurnool in the Deccan. Gamble first identified this plant as *W. glabrata* DC., but later, in the Flora of Madras, took it to be *W. tinctoria* DC. A note by Sir David Prain on one of the Calcutta Herbarium sheets of this number reads as follows:—"At Kew there

is only one sheet exactly like this. It is a sheet of Wight's Herb. proper which has given much trouble at Kew, as ours here at Calcutta." Wight himself has written, "*W. bicuspidata*?? Station? Nugger Hills perhaps." Above this Sir J. Hooker has written "*glabrata*? J. H. I expect it is a new species." Col. Gage agreed. There are three sheets of the type, two at Calcutta and one (ex Gamble's Herbarium) at Kew, and I have seen Wight's specimen, which agrees with the type. Two sheets in the Wallich Herbarium No. 6269 D (Nos. 48-49, p. 310) from Sukanagur and Nawabganj marked *Bertiera Tilia* are not typical *W. tinctoria* DC. and seem to be nearest to this sub-species.

16. *Wendlandia tinctoria* DC. sub-sp. **Handelii** Cowan. Sub-sp. nov.

Planta *Wendlandiae tinctoriae* DC. approximata sed tubo corollae multo brevior vix angustior, receptaculo pubescente, lobis calycis parce hirsutis, stipulis late triangularibus vel falcatis abruptissime acuminatis cuspidate nitida quam lamina longiore ornatis abunde discrepat.

WESTERN CHINA.—Yunnan: Manhao prope fines Tonkinensis, in regionibus tropicae declivibus siccis. Substr. schisto argilloso. Alt. 200-400 m. Flores albi, antherae flavidae, stigmata viridula, 2nd March 1915, Dr. Handel-Mazzetti No. 5874 (type).

I have regarded this plant as a distinct sub-species, mainly on account of its very much shorter and wider flowers as compared with those of *W. tinctoria* DC. From *W. Cavaleriei* Lévl. this sub-species is well distinguished by its shorter pubescent non-hirsute calyxlobes.

17. *Wendlandia tinctoria* DC. sub-sp. **floribunda** (Craib) Cowan in Craib, Flor. Siam. Enum. ii pt. 1 (1932), p. 23.

Wendlandia glabrata DC. var. *floribunda* Craib in Kew Bull. (1911), p. 386.

Wendlandia floribunda Craib in Kew Bull. (1913), p. 200; F.I.C. iii, p. 69 pro parte.

BURMA.—Fort Stedman. Flower red, November 1892, Abdul Huk; Keng Tung, alt. 4000 ft., December 1909, R. W. Macgregor No. 1260, and from the same locality No. 233.

SIAM.—Doi Sutep, Chiangmai, 10th February 1926, cream flowers, Mrs. D. J. Collins No. 1201; Doi Sutep, alt. 4800 ft., small tree about 25 feet high, open jungle, 19th February 1911, A. F. G. Kerr No. 1674; Nan, alt. c. 200 m., small tree about 8 m. high, flowers white, mixed forest, vern. *Kéng Kwang*, 23rd February 1921, A. F. G. Kerr No. 4875 pro parte; Payap-Doi Angka, near top of Doi Pa

Mawn, alt. c. 1650 m., 27th February 1931, H. B. G. Garrett No. 651.

The chief difference to be noticed between this sub-species and the true *W. tinctoria* DC. is that in the former there are a few strigose hairs on the outside of the corolla lobes, and it should be noted also that the calyx is glabrous or only very sparsely hairy. The panicle, even in the youngest parts, is practically without pubescence, and the leaves are somewhat smaller. The corolla is of the same shape and size and the anthers are similar in both. Sub-species *floribunda* has a shorter corolla tube than sub-species *barbata*, which it otherwise closely resembles.

18. *Wendlandia tinctoria* DC. sub-sp. *barbata* Cowan. Sub-sp. nov.

Arbuscula circa 3 m. alta; a typo *Wendlandiae tinctoriae* DC. alabastris floriferis apice pilosis, corollae tubo longiore, receptaculo glabro vel glabrescente, lobis calycis lanceolatis vel ovatis sparsissime pilosis vel glabris facile distinguitur; ab *Wendlandia floribunda* Craib tubo corollae longiore inter alia recedit.

CHINA.—Yunnan: Shan states, Szemao, A. Henry No. 13014; Mengtze, South East mountain forests, alt. 5000 ft., tree 10 feet high, A. Henry No. 10176 A (type); Lungchu, North West Hills, tree about 10 feet high, perfume like privet, 20th April?, Morse No. 548.

The presence of hairs on the exterior of the corolla lobes common to this sub-species and to *floribunda* make both easily separable from typical *W. tinctoria* DC. How far this will hold as a constant and diagnostic character has already been discussed and the matter cannot be settled without further field observation. Sub-species *barbata* differs from *floribunda* by having a longer corolla tube, pubescent panicle, and larger, longer-petioled leaves.

19. *Wendlandia tinctoria* DC. sub-sp. *orientalis* Cowan. Sub-sp. nov.

Wendlandia glabrata Hook. f. in Flor. Brit. Ind. iii (1882), p. 39 pro parte vix DC.; Kurz For. Flor. Brit. Burm. ii (1877), p. 74 pro parte vix DC.; Hemsley in Journ. Linn. Soc. xxiii (1888), p. 371 pro parte vix DC.; Brandis Ind. Trees (1906), p. 374 pro parte; Pitard Flore Générale de l'Indo-Chine iii (1922), p. 68 pro parte vix DC.

Arbor parva, circa 5 m. alta, *Wendlandiae tinctoriae* DC. subsimilis sed calyce omnino glabro, inflorescentia glabra nunc vix puberula, foliis plerumque 6-nerviis (in *W. tinctoria* DC. plerumque 8-nerviis inter sub-species alias bene notata; caetera cum typo congruit.

INDIA.—Assam: Naga Hills, Zumba alt. 500 ft., 1st March 1882, H. Collett No. 198; Manipur, Laireain, alt. 3000 ft., 5th April 1882,

G. Watt No. 6247; Manipur, Kegwinia, Naga Hills, alt. 6000 ft., April 1882, G. Watt No. 7287; Naga Hills Kohima, alt. 4500 ft., 10th May 1886, D. Prain sine no; Phirima, alt. 700 ft., 26th March 189—?, Dr. King's collector No. 134; Manipur, Metaiphum, alt. 4000 ft., 18th February 1882, G. Watt No. 6080.

Lushai Hills: valley near Fort Lungleh, alt. 3000 ft., 3rd March 1899, A. T. Gage No. 34.

BURMA.—Ruby Mines, Mogok, alt. 4000 ft., May 1910, A. Rodger No. 348; Ruby Mines, March 1891, plant 10-12 ft. high, Abdul Huk No. 215; Maymyo Plateau, alt. 3500 ft., 25th April 1908, J. H. Lace No. 3157; Arakan Yoma Sandoway, 6th February 1931, Ba Pe No. 11981; Pegu, Kelloh Toungyas, towards Sowah Doh, alt. 2-4000 ft., S. Kurz No. 1413; Thaton, Zingyaik Forests, alt. 3000 ft., 8th February 1928, a tree 15 feet high, wood durable, used for posts, Po Chin No. 6427; Martaban, Taipoo, alt. 4000 ft., 1859, in Herb. Brandis No. 1252; Moulmein, 1859, Mr. Parish No. 122; Amherst, Kawkareik-Myawaddy road, alt. 1000 ft., flowers white, 25th February 1927, C. E. Parkinson No. 5263; Tavoy, Heinze Reserve, 20th February 1928, Ba Pe No. 8132; Tenasserim, 9 miles north of Tavoy, vern. *Taung-by-in*, 28th March 1904, F. B. Manson No. 421; Tenasserim, Limatee, alt. 5000 ft., 10th April 1877, G. Gellately No. 681; Tenasserim, Yungzalun River, 27th March 1877, G. Gellately No. 497; Tenasserim, Herb. Helfer ex Herb. East Ind. Co. Kew Distrib. Nos. 2831 and 2832; Shan Hills Terai, alt. 2000 ft., February 1888, H. Collett No. 428; Southern Shan States, Mawbimai, alt. 3000 ft., 24th January 1911, W. A. Robertson No. 225; Southern Shan States, without precise locality, January 1891, Abdul Huk in Herb. Calcutt.; Southern Shan States, Lakut Laung, alt. over 5000 ft., February 1910, W. A. Robertson No. 134; Southern Shan States, Saga, 1894, Abdul Khalil sine no; Southern Shan States, Mong Nai, trans Salwin, alt. 2500 ft., 16th March 1911, W. A. Robertson No. 271 (type).

SIAM.—Maharat, Lampang, Mè Mai, 600 m. Dipterocarp and Shorea deciduous forest, a small evergreen tree, bark reddish, stem rather twisted, flowers white, scented, vern. *Khaeng Kwang*, 21st March 1923, Winit, No. 830; Pre, alt. 520-800 ft., Luang Vanpruk No. 112; Phrai H. Thaham, alt. 1100 ft., large tree 1 ft. in girth, vern. *Vung Fan* 28th December 1910, Luang Vanpruk No. 211; Kao Knading, Dôï, alt. 1000-1200 ft., a tree 1-8 ft. high, light evergreen forest, 10th February 1931, A. F. G. Kerr No. 20056; Doi Nang Ka, Chiangmai, 4th November 1930, Put No. 3359, and Chiangmai, 23rd April 1931, Put No. 3743; Nan, alt. c. 200 m., a small tree about 8 m. high, flowers white, mixed forest, vern. *Keng Kwang*, 23rd February 1921, A. F. G. Kerr No. 4875, pro parte; Chaiyapum, alt. 1-200 m., a tree about 6 m. high, deciduous forest, 30th January 1931, A. F. G. Kerr No. 19969.

CHINA.—Yunnan: Près Kouang-Yn, 13th February 1891, M. l'abbé Delavay in Herb. Kew; Hills 3 days south of Tengyueh, lat. $24^{\circ} 20' N.$, long. $98^{\circ} 33' E.$, alt. 8000 ft., a shrub 10-20 ft., flowers creamy white, in thickets, May 1925, G. Forrest No. 26398; Red river valley, near Manhao, alt. 2500 ft., Henry No. 10176 pro parte; Szemao, alt. 4500 ft., a shrub 10-15 ft., very common, Henry No. 10176B.

The following are perhaps only forms of this species:

INDO-CHINA.—Pierre No. 1232 in Herb. Mus. Paris; Laos Muong-yon, Spire No. 3756 in Herb. Mus. Paris.

Hitherto most of the plants now included under *W. tinctoria* sub-sp. *orientalis* Cowan were taken as identical with the Javanese *W. glabrata* DC. on account of the ovary being glabrous. Gamble and others have noted that *W. tinctoria* DC. might be glabrous in this respect. In flower this sub-species (of which Robertson's No. 271 from the Southern Shan States may be taken as the type) scarcely differs from *W. tinctoria* DC. except by having a glabrous calyx but this seems to be a character that can be fairly well relied upon. The shape of the flower differs from that of the Javanese *W. glabrata* DC.

W. photinifolia of Pitard may turn out to be an Indo-Chinese form of this sub-species, but the flowers on the type sheet are so imperfect that it is impossible to come to any definite conclusion regarding it.

Some of the Herbarium specimens from Burma and Indo-China have a slightly shorter corolla tube and smaller leaves than the normal, but this variation seems scarcely sufficient to warrant varietal status.

20. *Wendlandia coriacea* DC. Prod. iv (1830), p. 412; Don, Gen. Syst. iii (1834), p. 519; Steud. Nom. Bot. (1841), p. 786; Hook. f. in Flor. Brit. Ind. iii (1882), p. 39; Brandis Ind. Trees (1906), p. 374; Wall. Cat. No. 6279.

NEPAL.—Without precise locality, 1821, Wall. Cat. No. 6279 (type); without precise locality, J. Scully No. 11; without precise locality, F. Buchanan-Hamilton in Herb. Calcutt.; Environs of Katmandu, alt. 5-7000 ft., 4th-8th March 1857, Schlagintweit.

INDIA.—Sikkim and Bengal: Sikkim, without precise locality, S. Kurz ex Herb. Sulp. Kurz in Herb. Calcutt.; Sikkim, alt. 2-3000 ft., J. D. Hooker, in Herb. Ind. Or. Hook. f. et. Thomson; Darjeeling, Teesta Valley, March 1874, J. S. Gamble No. 3718A; Darjeeling, Terai, March 1881, G. Watt sine no; Banderjhol, alt. 3000 ft., February 1882, J. S. Gamble No. 10252 and No. 10254; Rungeet, alt. 2000 ft., 1st April 1920, Cave sine no; Mungpoo, alt. 3000 ft., 28th March 1885, G. A. Gammie No. 4; Mungpoo, March 1878, J. L. Lister in Herb. Calcutt.; Mungpoo, February 1900, Prain's Collector; Mungpoo, alt. 3000 ft., 1st May 1918, Cave in Herb.

Edin.; Singare Pahar, small tree, March 1873, J. S. Gamble No. 3719A; Sivoke Bridge, a small tree, March 1873, J. S. Gamble No. 3719B; Sivoke, a small tree, March 1873, J. S. Gamble No. 62; above the Rungeet, below Badamtan, alt. c. 1500 ft., flowers white, privet scented, 9th April 1913, Lacaita No. 36.

This species, confined in its distribution to Nepal and Sikkim, has long, rather narrow, coriaceous, acuminate leaves. The bracts on the panicle are remotely and irregularly serrate, the corolla tube is longer than that of *W. tinctoria* DC. and scarcely widens upwards. The anthers are linear to linear-oblong and are almost sessile, the stamens, although exerted, lie close to the corolla tube. The stipules are pointed. The type Wall. Cat. 6279 is from Nepal. *Rondeletia coriacea* of Sprengel and of Wallich in Roxb. Flor. Ind. ed. Carey et Wall. ii (1824), p. 142 is a Brazilian plant.

21. *Wendlandia Gamblei* Cowan. Sp. nov.

Species aspectu *Wendlandiae coriaceae* Wall. sed tubo corollae longiore, lobis calycis minutis, notisque aliis distincta.

Arbor parva omnino glabra; ramuli hornotini subquadrangulares, plus minusve sulcati sanguineo-rufi; annotini teretes rugosi. Folia coriacea, opposita vel raro 3-nata, elliptica vel elliptico-oblonga, utrinque glabra, supra atroviridia, costa insculpta, venulis indistincte reticulatis, infra olivacea, costa prominente, nervis lateralibus 7-10-paribus satis conspicuis valde curvatis intra marginem fere anastomosantibus, apice brevi-acuminata basi attenuata. Petiolus 2-3 cm. longus parte superiore nunc lamina decurrente anguste alatus. Stipulae interpetiolares pumilae apice acutae mox deciduae. Inflorescentia ad 18 cm. longa et lata, repanda; rami inferiores bracteis 4-5 cm. longis 1.5-2 cm. latis, petiolo tenue 1.5-2 cm. longo munitis sursum diminuentibus praediti; superiores minoresque bracteis lineari-triangularibus vix ad 2 mm. longis acutis basi hastatis instructi. Flores sessiles vel subsessiles, 1-3-fasciculati, bracteolis inconspicuis unicus vel binis ornati. Receptaculum glabrum; lobi calycis parvi acuti vel rotundati. Corolla tubiformis 8-9 mm. longa, lobis ovatis reflexis quadruplo longior, intus ad medium pilosa. Antherae lineares basi sagittatae, filamentis brevissimis. Stigma bifidum lobis lanceolatis crassis. Capsula globosa lobis calycis coronata; semina reticulata.

INDIA.—Madras: Ganjam, Mahendragiri, alt. 4500 ft., March 1884, J. S. Gamble No. 13965 (type); Ganjam, Mahendragiri, alt. 4600 ft., April 1904, Fischer and Gage No. 35; Godavari, Rumpa Hills, alt. 2000 ft., February 1885, J. S. Gamble No. 16014; Vizagapatam, Vantala, alt. 4500 ft., 11th May 1914, in fruit, A. W. Lushington sine no.

In the Flora of Madras, Gamble included this species under *W.*

glabrata DC. It is very different from the Javanese plant nor will it be confused with the other Madras species (*W. Heyneana* W. et A. and *W. bicuspidata* W. et A.) with glabrous receptacles. It is clearly allied to the Nepal and Sikkim plant *W. coriacea* which it closely resembles, both in leaf and in flower, but the flowers are distinctly shorter. *W. Gamblei* has been found only on the northernmost part of the Eastern Ghats at an elevation of about 4500 ft.

22. **Wendlandia Heyneana** Wall. Cat. 6274; Wight et Arnott in Prod. i (1834), p. 403; Steud. Nom. Bot. (1841), p. 786.

Wendlandia glabrata Hook. f. in Flor. Brit. Ind. iii (1882), p. 39, pro parte, vix DC.; Gamble in Flor. Madras iv (1921), p. 586, pro parte, vix DC.

Rondeletia americana Heyne et *Rondeletia Hamiltoniana* Heyne ex Wall. Cat. No. 6274.

INDIA.—Madras: Mysore? Wall. Cat. No. 6274 (type); Cuddapa Hills, rare, R. H. Beddome No. 3517 in Herb. Brit. Mus. (received 1885) Cuddapa District, Lankamalais, alt. 2300 ft., corolla white or pink, 15th March 1923, C. E. C. Fischer No. 4778; From the same locality in fruit 14th March 1923, C. E. C. Fischer sine no.; Chingleput, Kambakkam Hill, Alt. 2300, 7th April 1923, flowers white, C. E. C. Fischer No. 4784.

Wallich named the Madras plant No. 6274 in his Herbarium, *Wendlandia Heyneana* in honour of Dr. Heyne, who probably collected it in Mysore. It was first described by Wight and Arnott in their Prodrum. In the Flora of British India, Hooker includes this species under *W. glabrata* DC. Gamble in the Flora of Madras included under *W. glabrata* DC, both *W. Heyneana* Wall. and *W. Gamblei* Cowan, and his description is a composite one covering the three species. The two Madras species are quite different, *W. Heyneana* having elliptic anthers, hairs in the throat of the corolla, a more compact panicle with ascending branches and shorter petioled, more ovate leaves with a different texture and venation. The minute blunt or rounded calyx lobes are the characters by which *W. Heyneana* Wall. can most readily be separated from *W. tinctoria* sub-sp. *orientalis*, *W. bicuspidata* and *W. glabrata* all of which have longer triangular calyx lobes. In *W. Heyneana* the corolla, 5-6 mm. long, is about 5 times as long as the ovate lobes themselves. The receptacle is glabrous and flatter than in related species being as broad as, or broader than, it is long. The younger parts of the panicle are very minutely pubescent. The leaves are 6-8 nerved, elliptic, somewhat abruptly cuneate at the base with a thick petiole 1-1.5 cm. in length. The stipules are small, triangular, with a keel extending, from the apex, half-way to the base and are ciliate on the margin.

Fischer's specimens are very similar to the type, and I take them

to be this species; it is interesting to find it collected again after a long interval.

23. *Wendlandia Warburgii* Merrill in Philipp. Journ. Sc. xxvi (1925), p. 495.

This Philippine Island species has only once been collected, in the Isabela Province of Luzon by Warburg in 1888, and the type is his No. 12016. I have not seen the plant and unfortunately no description of the stamens is given. The calyx is glabrous, the corolla tubular, about 3 mm. long. The leaves are smaller than in other Philippine species, being 5-8 cms. in length. The panicle is described as 3 cm. long by 2.5 cm. in diameter. I have tentatively placed it in the *Tinctoriae* sub-series.

24. *Wendlandia bicuspidata* Wight et Arnott in Prod. i (1834), p. 403; Steud. Nom. Bot. (1841), p. 786; Gamble in Flor. Madras iv (1921), pp. 587, 588.

Wendlandia Notoniana Wall. var. *bicuspidata* Hook. f. in Flor. Brit. Ind. iii (1882), p. 40.

Wendlandia Notoniana Wall. var. *zeylanica* Hook. f. l. c. p. 40.

CEYLON.—Without precise locality, March 1836, ex Herb. Wight propr. No. 417 in Herb. Edin.; Pussilowa, alt. 3000 ft., Gardner No. 338; without precise locality, ex Herb. James Macrae No. 11 and No. 458 in Herb. Brit. Mus.; without precise locality, Col. Walker in Herb. Kew et Edin.; without precise locality, coast and high ground, Col. Walker No. 5 in Herb. Kew.; Nuwara Eliya, February 1846, Thwaites C(eylon) P(lants) No. 315; without precise locality, spec. ex Herb. Rottlerianum in Herb. Kew; without precise locality, Herb. R. Wight propr. (Moon and Col. Walker, not Roxb.); without precise locality, March 1836, Herb. Wight propr. No. 417; without precise locality, Herb. Wight (Kew No. 316); ex Herb. Soc. Hort. Lond. 1839, J. S. Mackenzie in Herb. Kew.

This species is closely related to *W. Heyneana* Wall. (*W. glabrata* pro parte of the F.B.I.), but the branchlets of *W. bicuspidata* W. et A. are ferruginous-pubescent, the corolla is shorter, about 4 mm. long, and the calyx lobes are distinctly triangular, not rounded, and very minute. In both species the receptacle is usually glabrous, it is rarely pubescent at the base in *W. bicuspidata* W. et A. The leaves of *W. bicuspidata* are opposite, rarely ternate, obovate, acuminate, glabrous above with short stiff hairs at least on the nerves beneath. The stipules sometimes bicuspidate are commonly simply cuspidate, or they may be blunt or divided into two to the base. This variation in the shape of the stipule is greater than is normally found within one species of the genus. Different sheets, under C.P. No. 315, in other respects practically identical, have both cuspidate and bicuspidate

stipules. In other species (e.g. *W. grandis*) both cuspidate and bicuspidate stipules may occasionally be found on the same shoot, particularly on young branches. Stress cannot therefore be laid upon this character which does not permit of the species being satisfactorily divided into varieties.

Hooker's *W. Notoniana* Wall. var. *zeylanica* appears to be a laxer form of *W. bicuspidata* W. et A. There are several Ceylon sheets under this name collected by Thwaites, but from the description it is not possible to determine which is the type of the variety, none of them differ materially from the Ceylon specimens of other collectors.

The type of *W. bicuspidata* is a Ceylon plant—there is a note to the original description, "The specimen before us is from Ceylon but it is probably also found in the southern districts of the Peninsula." There are three sheets in Herb. Wight proper and one of these marked "*Wend. bicuspidata* W. et A." in Wight's own handwriting is presumably the type (Kew. No. 316). There is, however, no locality given upon this sheet and Gamble has taken it as a S. Indian plant for the Flora of Madras. This sheet exactly agrees with another in Herb. Wight proper now in the British Museum (No. 417) which is definitely marked Ceylon, March 1836, but with no determination. Both agree with a third Ceylon sheet ex Herb. Wight proper (Kew. 190). There are fruiting and flowering specimens on the first two sheets, and the stipules are sometimes bicuspidate, sometimes cuspidate.

A specimen in fruit, ex Herb. Wight No. 1336 in Herb. Kew. without locality, seems nearest *W. bicuspidata* W. et A. and has been so determined by Gamble and included in the Madras Flora. A second very much damaged sheet in Herb. Calcutt. under this number, again without locality, agrees. A third sheet in Herb. Calcutt., under No. 1336, without locality, is definitely *W. thyrsoidea* (Roth) Steud.

It follows, therefore, that there is no definite evidence that *W. bicuspidata* extends beyond Ceylon. It is the only Ceylon species and is probably confined to the island. At least I have seen no specimen of *W. bicuspidata* W. et A. which can definitely be stated to have been gathered on the peninsula.

25. *Wendlandia philippinensis* Cowan. Sp. nov.

Species haec ex affinitate *Wendlandiae glabratae* DC., aspectu *Wendlandiae luzoniensis* DC. sed ab hac stipulis cuspidatis nec rotundatis, ab illa floribus multo majoribus inter alia signa differt.

Arbor vel frutex; ramuli juniores teretes 2-3 mm. diam. leviter striati minute cinereo-puberuli cortice flavido-rufo.

Folia membranacea, 7-9 cm. longa, 2.5-4 cm. lata, elliptica vel elliptico-lanceolata, integra, apice breviter obtusiuscule acuminata vel acuta, basi in petiolum circa 1-1.5 cm. longum usque ad medium

plus minusve anguste alatum sensim attenuata, supra glabra in sicco rufo-brunnea subtus pallidiora costa minute cinereo-hirsutula nervisque 7-9-paribus satis prominentibus conspicue rubidis, caeterum glabra.

Inflorescentia ampla circa 15 cm. longa, 20 cm. lata, ramis ascendentibus; bracteae ad 10 mm. longae anguste lanceolatae vel ligulatae, ultimae reductae vix 2 mm. longae. Flores sessiles plerumque 3-fasciculati. Calyx omnino glaber, 1 mm. longus, lobis triangularibus acutiusculis circa 0.25 mm. longis. Corollae tubus fere cylindricus ad imum abrupte constrictus, 5-6 cm. longus, lobis ovatis quadruplo brevioribus. Antherae ovoideae, filamentis brevissimis. Stylus bifidus lobis oblanceolatis. Fructus non visus.

PHILIPPINE ISLANDS.—Luzon Prov. Benguet Daklan to Kabayon, October-November, 1905. Elmer D. Merrill No. 4409.

In flower this species, with a relatively long corolla tube, resembles *W. luzoniensis* DC., but the corolla is somewhat wider in proportion to its length. At the same time the receptacle and calyx lobes are quite glabrous as in *W. luzoniensis* DC. var. *syringoides*. From the latter it differs in having cuspidate, not rounded stipules, and on this account is regarded as a distinct species. From *W. glabrata* DC. var. *laevigata* Miq. it is at once distinguished by its wide corolla tube. The stipules are flatly triangular or falcate, ending very abruptly in a narrowly ligulate tip, those of *W. glabrata* DC. are narrowly triangular and end in a short cusp which is more or less carinate.

26. *Wendlandia glabrata* DC. Prod. iv (1830), p. 411; Don, Gen. Syst. iii. (1834), p. 518; Steud. Nom. Bot. (1841), p. 786; Miquel, Flor. Ind. Batav. ii (1860), pp. 158, 345 et Ann. iv. (1869), p. 222; Kurz, Flor. Brit. Burma ii (1877), p. 74, pro parte vix DC.; Hook. f. Flor. Brit. Ind. iii (1882), p. 39, pro parte vix DC.; Maxim. in Mém. Biol. xi (1883), p. 777 pro parte vix DC.; Hemsley in Journ. Linn. Soc. xxiii (1888), p. 371, pro parte vix DC.; Boerlage in Hand. Flor. Ned. Ind. ii (1891), p. 123; Drake del Castillo in Journ. de Bot. ix (1895), p. 207, pro parte vix DC.; Koorders et Valetton Bijdr. Boomsorten, Java viii (1902), p. 59; Koorders et Valetton, Atlas Baumarten Java (1915), t. 508; Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 68, pro parte non DC.

Rondeletia tinctoria Blume in Bijdr. Flor. Ned. ix (1825), p. 974, non Roxb.

Wendlandia laevigata Miq. Flor. Ind. Batav. ii (1860), p. 346, et Ann. iv (1869), p. 222; Boerlage l.c., p. 123.

Wendlandia tinctoria Miq. Flor. Ind. Batav. ii (1860), p. 158, non DC.

Rhombospora (Wendlandia) sumatrana Miq. Flor. Ind. Batav. ii (1860), pp. 159, 345; Boerlage, l.c., p. 123.

Wendlandia tenuiflora Miq. MS. ex Hook. f. in Flor. Brit. Ind. iii (1882), p. 39.

JAVA.—Without precise locality, De Vries in Herb. Kew.; near Batavia, 1838, Dr. Kohmann No. 566; without precise locality, 1846, I. Lobb No. 235; South-East Java, 1880-1882, H. O. Forbes No. 1202; Praenger, Iter Warburgianum, 1885-1889, O. Warburg No. 2894.

The type of *W. glabrata* DC. is Blume's plant from the mountains of Java—*Rondeletia tinctoria* of Blume non Roxb.

There is obviously a good deal of variation in the Javanese plants now known as *W. glabrata* DC. and Koorders and Valeton, in 1902, examined all the available material from Java and came to the conclusion that the species is a very variable one. They were not able to separate its various forms, and their description allows for considerable latitude in the relative length of the calyx lobes and in the length and shape of the corolla.

It is possible that further examination and field study would reveal diagnostic characters upon which varieties might be clearly separated. The material at my disposal is, however, not sufficient to enable definite conclusions to be drawn, and I have not been able to examine the type. Koorders and Valeton state that no subsequent collections exactly match the type, but that those from Banten agree best with it. Judging by their description there is also no sheet in British Herbaria which exactly matches the type, but "*R. tinctoria* Dr. Kaullman No. 566" in Herb. Brit. Mus. is probably very near to it.

Although Koorders and Valeton state that numerous specimens show intermediates, from plants densely pubescent to nearly glabrous as to the panicle, from shorter to longer corollas and from very short calyx lobes, to lobes half as long as the receptacle, I find that some specimens apparently correctly determined as *W. laevigata* Miq. have a longer and more tubular corolla than the others which are shorter and trumpet shaped, the panicles are respectively somewhat densely ferruginous pubescent and less densely, greyish pubescent. I therefore retain Miquel's species tentatively as a variety of *W. glabrata* DC.

This uncertainty with regard to the Javanese species need not, however, preclude us from differentiating between it and other species from India, China, the Malayan Archipelago and the Philippine Islands, which have been identified with it principally because of their glabrous calyces. As has been pointed out, there is a definite linkage between the Javan *W. glabrata* DC. and the Indian *W. tinctoria* DC. and some of the glabrous forms from the mainland are certainly more closely related to the latter species. From "*W. glabrata*"

plants with rounded stipules and with linear and exerted anthers have here been excluded.

The chief characteristics of the true *W. glabrata* DC., the Javanese plant, are (following the indication of Koorders and Valetton) as follows: juvenile leaves and branchlets shortly hairy, the mature leaves shortly hairy on the lateral nerves (which are about 10 in number), rarely becoming quite glabrous, stipules pointed with a carinate tip, flowers usually shortly pedicelled and disposed singly or in threes, the tube of the corolla is hairy within, the calyx lobes vary from rounded and small to pointed and triangular and are nearly as long as the receptacle.

26a. Var. *laevigata* Cowan. Comb. nov.

Wendlandia laevigata Miq. Flor. Batav. ii (1860), p. 346.

JAVA.—Praenger, Iter Warburgianum 1885-1889, O. Warburg No. 2893; Praenger, S. H. Koorders No. 6880 β ; Pengalanga, alt. 4300 ft. in Herb. Kew.; Gedeh, "*Wendlandia laevigata* Miq." Miquel in Herb. Kew.; Without precise locality, 26th March 1909, Plantae Junghuhnianae ineditae No. 327; Without precise locality, 25th January 1819, Christian Smith No. 13; Sumatra, without precise locality, ex Herb. Miq. in Herb. Kew.

In the variety the panicle is ferruginous-pubescent, the corolla tubular, scarcely expanding at the mouth, and the calyx lobes are triangular.

27. *Wendlandia Amocana* Cowan. Sp. nov.

Species affinis *Wendlandiae glabratae* DC. a qua inflorescentia folisque omnino glabris, floribus minoribus, corolla brevi, os versus distincte dilatata, antheris subsessilibus minimis ovoideis, inter alia distincte divergit.

Arbor ad 12 m. alta trunco 1 m. ambitu; rami juniores et inflorescentia et folia omnino glabra. Ramuli teretes laeves, flavido-rubri. Folia 8-15 cm. longa, 4.5-5.5 cm. lata, membranacea, elliptico-lanceolata apice longiuscule acuminata basi in petiolum brevem 1.5-2 cm. longum nonnunquam oblique attenuata, supra atroviridia lutescentia, costa impressa, nervis 5-6-paribus valde arcuatis prope marginem accedentibus infra pallidiora costa prominente minute puberula venulis reticulatis, caeterum glabra. Stipulae complanatae late triangulares apice cuspidatae, circa 3 mm. longae 2 mm. latae. Panicula utrinque ad 20 cm. repanda ramis decussatis. Flores sessiles albo-lutei eleganter dispositi, 1-3-fasciculati bracteis subulatis vix 2 mm. longis, bracteolis minutis receptaculum vix aequantibus. Lobi calycis triangulares acuti, receptaculo glabro lobis 4-5-plo longiore. Tubus corollinus 3 mm. longus ad os sensim dilatatus intus medium versus pilis instructus, lobis 5 brevibus rotundatis. Stylus bifidus distincte

exsertus, lobis obovatis. Capsula circa 1.5 mm. diametro, vix ad medium in duas partes dehiscens.

INDIA.—Bengal: Chittagong: Baraiyadala, April 1920, J. M. Cowan No. 158; Kurusia, Patiya, 22nd August 1921, J. M. Cowan No. 415; Kodala Hill, a tree 30-40 ft. high, 3-4 ft. in diam., flowers yellowish, February 1886, Dr. King's Collector Badul Khan No. 378; Jaldi, 25th November 1920, J. M. Cowan No. 2212 (type), and No. 2439; Chittagong Hill Tracts: Without precise locality, 1886, Dr. King's Collector No. 313 and No. 435; Rangamatia, 24th February 1879, J. S. Gamble No. 6708A and No. 6708 (2); Rangamatia, March 1880, J. S. Gamble No. 7970; Kasalong, 19th February 1876, J. L. Lister No. 38; Sitapahar Range, 1920, J. M. Cowan No. 607.

The Chittagong and Chittagong Hill Tracts plant described above differs markedly from *W. tinctoria* sub-sp. *orientalis* Cowan in the shape and texture of its foliage, and its flowers are much shorter with a trumpet shaped corolla. It resembles the Javan *W. glabrata* DC., which, however, has a larger inflorescence, with the flowers usually arranged singly upon the branches. The leaves of the Javan plant are more rounded at the base and are 8-10-nerved.

28. *W. ferruginea* Pierre ex Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 62, t-6. fig. 10, p. 59.

INDO-CHINA.—Tonkin: Mt. Bavi, près Tu-phap, Balansa sine no. Cochinchina: Mt. Chiaoخان, aux sources du Donnai, Pierre sine no.

Following Pitard's description and key, this species along with *W. Thorelii*, also from Indo-China, can be distinguished from other members of this sub-series by the short corolla tube, which does not exceed the length of the corolla lobes. As stated on page 258 I am inclined to think that this character may apply only to the young flowers, but I have not seen enough material to be certain. A full description of *W. ferruginea* Pierre is given in Lecomte's Flore de l'Indo-Chine.

29. *W. Thorelii*, Pitard, in Flore Générale de l'Indo-Chine iii (1922), p. 62.

INDO-CHINA.—Laos: Paklay, Thorel, sine no.

This species is probably very closely related to the glabrous forms of *W. tinctoria* DC. and should perhaps be placed next to the sub-species *orientalis*. The Indo-China plant is, however, described as having a very short corolla, and if this character holds in the adult state (see page 257) it is undoubtedly a distinct species. I have, by the courtesy of the Director of the Paris Herbarium, been able to examine part of the type, but the material is so poor that I am quite

unable to come to any definite conclusion regarding it. The species is, however, described by Pitard.

30. *Wendlandia angustifolia* Wight MS. ex Hook. f. in Flor. Brit. Ind. iii (1882), p. 40, descript. ampl. Cowan; Brandis Ind. Trees (1906), p. 374.

Arbor glabra ramulis tenuioribus, internodiis brevibus, cortice brunneo. Folia 3-fasciculata anguste lineari-lanceolata, coriacea, glabra, utrinque attenuata, 4-11 cm. longa 0.5-1.75 cm. lata, costa nervisque lateralibus 6-8-paribus subtus prominentibus. Petiolus circa 1 cm. longus. Stipulae ovato-triangulares persistentes, apice subulato-cuspidatae, circa 5 mm. longae. Panicula terminalis multiflora, ad 22 cm. longa et 10 cm. diametro. Flores plus minusve conglomerati; bractae ligulatae apice acuminatae basi hastatae, florum pedicellis duplo longiores. Tubus calycis glaber, turbinatus, 1.5 m. longus, lobis cuspidatis 1 m. longis. Corolla alba tubiformis sursum dilatata, 5 mm. longa, ad os 1-1.5 mm. lata, lobis triangularibus acutis. Stamina exserta, filamentis brevioribus, antheris dorsifixis linearibus circa 1 mm. longis. Stylus 6 mm. longus valde exsertus, stigmatibus bifido. Fructus globosus rugosus 2 mm. diametro, lobis calycis coronatus, fere ad medium in partes duas dehiscens.

INDIA.—Madras: Courtallum, April 1835, in Herb. Wight, No. 372 pro parte (type); Courtallum, Herb. Wight, No. 1334 in Herb. Calcutt. pro parte; Tinevelly, beds of rivers, foot of Ghats, rare, R. H. Beddome No. 3522.

The distinctive character of this species is its narrowly linear-lanceolate foliage. Its less prominent style and anthers and glabrous calyx will distinguish it from *W. salicifolia*, Franch, which it superficially resembles.

31. *Wendlandia ternifolia* Cowan. Sp. nov.

Wendlandia glabrata Castillo in Journ. de Bot. ix (1895), p. 207, pro parte vix DC.; Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 68, pro parte vix DC.

Species affinis *Wendlandiae tinctoriae* DC. ejusque sociis propioribus sed foliis ternatis, lobis calycis brevioribus notisque aliis bene distincta.

Arbuscula 4-5 m. alta; rami juniores teretes, leviter striati ad nodos nonnunquam subquadrangulares, distincte cinereo-puberuli. Folia ternata vel opposita membranacea, omnino glabra vel subtus tantum ad nervos minutissime puberula 6-9 cm. longa 3-4 cm. lata, apice breviter acuminata vel acuta, basi cuneata, costa supra insculpta infra prominente, nervis 6-7-paribus sursum recurvis inter marginem fere anastomosantibus. Petiolus gracilis ad basin versus fere canaliculatus 1-1.5 cm. longus. Stipulae late triangulares vel arcuatae, apice cuspidate anguste lineare quam lamina haud breviorae praeditae.

Inflorescentia terminalis repanda circa 15 cm. longa, 20 cm. lata, ramis ascendentibus pubescentibus. Bractee inferiores foliaceae petiolatae, sursum diminuentes caeteris circa 1 mm. longis ovatis vel ligulatis interdum pilosis basi plus minusve hastatis. Corolla tubiformis circa 4 mm. longa intus dimidio superiore et fauce albido-hirsuta, lobis ovatis extus pilis perpaucis instructis, 5-6-plo brevioribus. Receptaculum glabrum, lobis calycis triangularibus subacutis glabris vel nunc margine sparsim hirsutis, quadruplo brevioribus. Antherae oblongae circa 0.5 mm. longae 0.25 m.m. latae, filamentis subnullis. Stigma exsertum bifidum lobis rotundatis. Capsula rugosa fere ad medium in duas partes dehiscens.

INDO-CHINA.—Tonkin: Tu Phap dans les bois, arbuste de 4-5 m. Corolle blanche, April 1887, B. Balansa No. 2586, (type); Tu Phap, dans les bois, August 1886, B. Balansa No. 2584.

The affinity of this species is with *W. tinctoria* DC. and *W. glabrata* DC. Like *W. tinctoria*, sub-species *floribunda* and *barbata* it has a few hairs on the exterior of the corolla lobes, but as regards the calyx lobes it differs from them and the leaves are often in threes. The receptacle is glabrous.

32. *Wendlandia thyrsoides* (Roth) Steud. Nom. Bot. ed. ii (1841), p. 786.

Canthium thyrsoides Roem. et Schult. in Linn. Syst. v (1819), p. 207. *Webera thyrsoides* Roth. MS.

Webera thyrsoides Roth, Nov. Pl. Spec. (1821), p. 149.

Wendlandia Notoniana Wall. Cat. (1828) No. 6273; Wight et Arn. Prod. i (1834), p. 403; Don, Gen. Syst. iii (1834), p. 518; Bedd. Flor. Sylv. Mad. iii (1869-74), p. 130, et t. 224; Wight, Icones. Pl. Ind. Or. iii (1843-45), t. 1033; Wight, Spicil. Neilgherr. i (1846), t. 95; Bedd. Fl. Sylv. (1872), t. 224; Hook. f. Flor. Brit. Ind. iii (1882) p. 40, pro parte; Brandis, Ind. Trees (1906), p. 374; Fyson Fl. Nilgiri and Pulney Hill-tops iii (1920), p. 355; Gamble, Flor. Mad. iv (1921), p. 588.

Ixora congesta Wall. Cat. (1828) No. 6273B non Roxb.

Canthium Thunbergianum Steud. l.c. non Schlecht.

Ixora montana Miq. ex Hook. f. Flor. Brit. Ind. iii (1882), p. 40, non Lour.

Wendlandia montana K. Schum. in Engler's Pflanzfam. iv, 4 (1896), p. 37.

Wendlandia Lawii Hook. f. in Flor. Brit. Ind. iii (1882), p. 40; Gamble l.c., p. 588.

INDIA.—Madras: Bellary, Ramandrug, alt. 3000 ft., February 1889, J. S. Gamble No. 20355; Cuddapah, Horsleykonda, alt. 4500 ft., July 1884, J. S. Gamble No. 15034; Mangalore, Mrs. Ward in

Herb. Kew. ; Mangalore, 1847, R. F. Hohenacker No. 336 ; Malabar Concan, etc., Stocks, Law, etc., in Herb. Ind. Or. Hook. f. et. Thomson ; South Malabar, Karimalai, alt. 4-5000 ft., 23rd January 1910, C. E. C. Fischer No. 1649 ; Malabar District, Muthupallam, Bolampatti Hills, alt. 3000 ft., 13th March 1916, C. E. C. Fischer bis ; Mont. Nilgiri et Kurg, G. Thomson in Herb. Ind. Or. Hook. f. et Thomson ; Nilgiris, 1855, F. C. Cleghorn in Herb. Edin. ; Nilgiri Hill, March and April 1855, W. et A. No. 1239 ; Nilgiri Hill, April 1847, Herb. Wight No. 1338, also Nos. 1337, 1339 ; Nilgiri Hill, R. F. Hohenacker No. 1370 ; Nilgiri Hills in Herb. G. Watt sine no. ; Nilgiri, Naddivattum, alt. 5500 ft., 29th March 1870, C. B. Clarke No. 11352 ; Nilgiri, Naddivattum, 1872, Mauly No. 1214 ; Nilgiris, Culhatty, alt. 4000 ft., 26th March, 1870, C. B. Clarke Nos. 11267B, 11267C ; Nilgiris, Conoor Ghat, alt. 3000 ft., 7th March 1870, C. B. Clarke No. 10490A ; Nilgiris, Conoor Ghat, alt. 3500 ft., R. H. Beddome No. 3518 ; Nilgiris, Conoor, 12th June 1896, Sir A. G. Bourne sine no. ; Conoor, 30th January 1899, Dr. Prain sine no. ; Conoor, alt. 5000 ft., April 1883, J. S. Gamble No. 11263 ; Coimbatore, alt. 3500-6000 ft., 12th March 1906, C. E. C. Fischer No. 958 ; Coimbatore, alt. 3000 ft., March 1882, Dr. Brandis sine no. ; Coimbatore, 1902-03, A. W. Lushington in Herb. Kew. ; Pulney Mountains, September 1836, in Herb. Wight No. 1333 ; Madura District, Shembaganur, alt. 6000 ft., 29th June 1913, Rev. Aug. Saulieres No. 872 ; Madura District, Shembaganur, alt. 4500 ft., 14th May 1913, Saulieres No. 930 ; Shevaroy Hills, Perrott No. 21 ; Tinnevely, Neterikal, 13th February 1913, D. Hooper and M. S. Ramaswami No. 38583 ; Travancore, June 1835, Herb. Wight No. 1336 ; Travancore, Peermade, alt. 4500 ft., December 1909, A. Meebold No. 12,833 ; High Wavy Mountain, on slope, May 1917, Blatter and Hallberg No. 760 ; Anamalai Hills, alt. 3000 ft., July 1881, Beddome No. 10.

Bombay : Warne jungles, January 1849, ex Herb. Stocks in Herb. Kew. ; Mahableshwar, Dr. T. Cooke in Herb. Calcutt. ; Head of Coombharli Ghat at Helwank Hill to South, in Herb. Calcutt. ; Western Ghats, ex Herb. R. Wight prop. in Herb. Kew. ; Belgaum South and Ghats, flowers in January, Dr. Ritchie No. 350 ; Canara, Yellapur, very common, 15th February 1884, W. A. Talbot No. 892 ; Dr. Gibson in Herb. Calcutt. ; Herb. Wight ex Wall. Cat. No. 6273 in Herb. Calcutt. ; Canara, about February 1879, A. P. Young in Herb. Brit. Mus.

The fruit of this species was for a time unknown and in its early history the plant was assigned to several genera, which partly accounts for the intricate synonymy. It is unfortunate that under the International Rules of Nomenclature, the name *W. thyrsoidea* takes precedence over the better known name *W. Notoniana* Wall. The species was first named *Webera thyrsoidea* by Roth (1821). *Rondeletia thyrsoidea* of Swartz (1797) is a Jamaican plant. I have

followed Gamble in excluding from this species Hooker's variety *bicuspidata*, which differs in the size and shape of the flower and very obviously by having a glabrous receptacle. The variety *zeylanica*, with flowers similar to those of *W. bicuspidata* W. et A. has also been excluded. *W. Lawii* Hook. f. does not appear to be specifically distinct from *W. thyrsoides* Steud. The flowers of the type of *W. Notoniana* (Wall. 6273A) are identical with those of *W. Lawii* of Hooker. The two plants differ only in the longer and laxer panicle of *W. Lawii*.

The flowers of typical *W. thyrsoides* Steud. are very similar to those of *W. grandis* Cowan, differing by having longer anthers and longer calyx lobes. The corolla in the type is longer than that of *W. tinctoria* DC.

The usually ternate leaves and the folded, blunt and divergent, or even somewhat reflexed stipules and large pubescent panicle are the characters which best distinguish this South Indian species from its near allies.

Some specimens, which for the present I have included in this species, have somewhat shorter flowers, others show divergence in the length of the calyx lobes and in the pubescence on the leaves. How far these departures are due merely to differences of soil and climate requires further field work to decide. The species as now constituted ranges over Bombay and the greater part of the Madras Presidency, where conditions of soil and climate show great variation, and the less typical forms of the species are linked to the type by intermediates. It would be interesting to have further material.

32a. var. **Lawii** Cowan. Comb. nov.

Wendlandia Lawii Hook. f. in Flor. Brit. Ind. iii (1882), p. 40.

INDIA.—Malabar, Bababoodum Hills, Mr. Law.

A laxer form of *W. thyrsoides* (Roth) Steud. differing only in the form of the panicle and by having shortly pedicelled flowers. It has only once been collected, by Mr. Law in the Bababoodum Hills. The unusual development of the inflorescence may perhaps be due to some external agency; the same sort of departure is found in other species, e.g., *W. Wallichii* W. et A. var. *pedicellata* Cowan.

2. SUB-SERIES PANICULATAE.

The sub-series Paniculatae is in many ways comparable to the sub-series Tinctoriae. In the Paniculatae we have again a complex of closely allied species. The sub-series includes all those species which have stamens with short filaments, elliptical anthers, and stipules with a rounded, more or less orbicular tip which is reflexed and often obscures the stipular stem. The flowers, of some members of this group, closely resemble those of species within the sub-series

Tinctoriae, but the two groups may be easily separated by examining the stipules, which in the Tinctoriae are pointed.

In the foliage there is, generally speaking, a further difference between members of the two sub-series. Most of the Paniculatae have leaves, more or less strigose hairy on the underside, at least on the nerves, whereas the leaves of the Tinctoriae have as a rule only a few shorter hairs or are glabrous.

Fortunately it has been possible to identify the type of *W. paniculata* DC. which was described from a plant cultivated in the Royal Botanic Garden, Calcutta. This gives a definite starting point. Seed of *W. paniculata* DC. was brought to Calcutta by Captain Anderson from Amboyna, an island in the East Indian Archipelago and when the plant reached maturity in Calcutta, it was described for the first time by Roxburgh (Hort. Beng. pp. 15-18) as *Rondeletia paniculata*. In the Wallich Herbarium there is a specimen of this plant No. 6266A, and there is one sheet in each of the Herbaria of Kew, Edinburgh and Calcutta.

It would have been difficult to have made certain that these sheets are the type of *R. paniculata* Roxb. had there been no specimens collected in Amboyna. Of these I have seen three, viz., Treub's No. 373 collected in 1893, in the Kew Herbarium, Robinson's No. 1731 July-Nov. 1913 and Christian Smith's No. 284, 1796, in the British Museum. Except for a slight difference in the amount of pubescence on the calyx these are identical with Roxburgh's type from the Calcutta Garden, and there is no other material identical with these specimens of the Amboyna plant. It is interesting to note that in the Calcutta Herbarium there is now only one sheet left of the type and this when remounted had been wrongly labelled *W. tinctoria* DC., but part of the original label with the letters "H.B.C." is still on the sheet. In the Calcutta Herbarium there are also some old undated sheets of a plant ex Hort. Bot. Bogor., undoubtedly *Rondeletia paniculata* Roxb. so that the Buitenzorg Gardens probably received seed from Capt. Anderson at the same time as he sent it to Calcutta.

Having established the identity of the type of *W. paniculata* DC. we may look at the related species for the true *W. paniculata* DC. is evidently only one member of a large number of forms which differ more or less from each other. All may be grouped under the name Paniculatae.

In India, China and the East Indian Archipelago a great many forms occur, having the same general characteristics but differing in shape and length of the corolla tube, in the relative length of the corolla lobes; also in the amount of pubescence on the calyx, in the shape and length of the calyx lobes relative to the receptacle and in the stipules and foliage. Close comparison is often necessary to separate them. Already a large number of species which are more or less distinct from the Amboyna plant has been described within

the complex, but, on the other hand, a number of forms relatively more distinct have been overlooked, and pass under the same name as the Amboyna plant. In the general introductory remarks (pp. 234-235) it has been shown that this has led to a state of confusion as regards the relationship of the members of this group. The Amboyna plant the true *W. paniculata* DC., differs from all other members of the sub-series. The species which most closely resemble it are *W. Jung-huhniana* (Java), *W. Lauterbachii* (New Guinea) and *W. arborescens* (Malaya). Less near it is *W. andamanica*, a new species which differs in the flower, especially in having much larger calyx lobes. It has a different foliage, and is a more glabrous plant. *W. luzoniensis* DC. can be separated from its allies by its exceptionally long corolla tube, whilst *W. brachyantha* Merrill has a particularly short tube. *W. luzoniensis* DC. var. *syringoides* and *W. sibuyanensis* now described, have glabrous calyces. The roughness of the upper surface of the leaves of *W. scabra* Kurz, the Indian species, is a useful diagnostic character. This species also differs from typical *W. paniculata* DC. in its flower. *W. uvariifolia* Hance from China, and the various sub-species closely allied to it, *W. dasythyrsa* Miq. from Java and *W. buddleacea* Muell. from New Guinea, have wide stipules and are more densely pubescent than the true *W. paniculata* DC. The corolla in these species is almost cylindrical, whereas in the Amboyna plant it is distinctly trumpet-shaped. *W. Augustinii* and *W. nervosa* Merr. can be recognised by their exceedingly short panicles, and *W. erythroxyton* by the large ovate calyx lobes, exceeding the receptacle.

In classifying the species in this sub-series an attempt has been made to give specific names equal value. Several Chinese geographical forms, all of which seem more closely related to each other than to the Amboyna plant, have been grouped under the oldest name *W. uvariifolia* Hance.

Allowance has been made for reasonable variation within a species for it would appear that many of the islands have their own minor geographical forms. Thus plants from Negros, Palawan and Culion, differ somewhat from true *W. luzoniensis* DC. but are not distinct enough to be readily separated.

Key to the Species.

- A. Reflexed lobe of the stipule about twice as broad as the stem.
 - a. Receptacle and calyx lobes densely hirsute.
 - i Corolla tube 2-3 times the length of the lobes.
 - x. Calyx lobes as long as the receptacle.
 - 33-37.* *W. uvariifolia* (p. 286).
 - y. Calyx lobes not exceeding half the length of the receptacle.
 - i Corolla c. 2-5 mm. long. 38. *W. buddleacea* (p. 289).
 - ii Corolla c. 4 mm. long. 39. *W. dasythyrsa* (p. 289).

* For the distinguishing characteristics of sub-species of *uvariifolia* see p. 287 et seq.

2. Corolla tube 6-8 times as long as the lobes.
40. *W. Williamsii* (p. 290).
- b. Receptacle and calyx lobes sparsely pubescent.
41. *W. paniculata* (p. 290).
- B. Reflexed lobe of the stipule almost as broad as the stem or narrower.
- a. Receptacle and calyx lobes hirsute or pubescent.
- i. Calyx lobes about as long as or longer than the receptacle.
- x. Panicle not stiffly erect.
42a *W. scabra*, var. *dependens* (p. 292).
- y. Panicle stiffly erect.
- i. Leaves \pm scabrid above, hirsute below.
42. *W. scabra* (p. 291).
- ii. Leaves glabrous above, nerves pubescent below or entirely glabrous.
43. *W. brachyantha* (p. 293).
2. Calyx lobes half or less than half as long as the receptacle.
- x. Panicle spreading, more than 12 cm. long.
- i. Leaves not exceeding 10 cm. in length.
- (a) Panicle pubescent. Leaves ovate.
44. *W. tonkiniana* (p. 293).
- (b) Panicle glabrescent. Leaves elliptic to elliptic lanceolate.
45. *W. nobilis* (p. 293).
- ii. Leaves more than, usually much exceeding, 10 cm. in length.
- (a) Petiole 1 cm. or less \pm winged to the base.
41. *W. paniculata* (p. 290).
- (b) Petiole 1-2 cm., not winged to the base.
- (1) Corolla tube more than 5 times as long as the lobes.
46. *W. luzoniensis* (p. 294).
- (2) Corolla tube less than 5 times as long as the lobes.
- (x) Main branches of the panicle in the axils of leafy bracts. Leaves narrowly cuneate at the base.
47. *W. andamanica* (p. 295).
- (y) Main branches of the panicle (except perhaps the lower) without leafy bracts at the base. Leaves broadly cuneate at the base.
- (i) Leaves bluntly acute, broadest below the middle.
48. *W. Lauterbachii* (p. 296).
- (ii) Leaves obovate to ovate shortly and abruptly acuminate.
* Large tree, panicle densely ferruginous tomentose. 49. *W. arborescens* (p. 296).
** Shrub or small tree, panicle cinereo-pubescent, glabrescent. 50. *W. Burkilii* (p. 297).
- y. Panicle short, less than 12 cm. long.
- i. Leaves sub-orbicular. 51. *W. rotundifolia* (p. 297).

- ii. Leaves elliptic to ovate.
 (a) Leaves 3-6 cm. long. 52. *W. Augustinii* (p. 298).
 (b) Leaves 6-13 cm. long. 53. *W. nervosa* (p. 298).
- b. Receptacle and calyx lobes glabrous.
 i. Calyx lobes broadly ovate, longer than the receptacle.
 54. *W. erythroxyton* (p. 299).
 2. Calyx lobes triangular, shorter than the receptacle.
 x. Corolla tubular, over 5 mm. long.
 46b. *W. luzoniensis*. var. *syringoides* (p. 295).
 y. Corolla infundibular, less than 5 mm. long.
 i. Corolla c. 4 mm. long, c. 4 mm. wide at the mouth.
 55. *W. sibuyanensis* (p. 299).
 ii. Corolla c. 2 mm. long, 2 mm. wide at the mouth.
 56. *W. Junghuhniana* (p. 300).
33. *Wendlandia uvariifolia* Hance in Journ. Bot. viii (1870), p. 73; Maxim. in Mém. Biol. xi (1883), p. 776; Merrill in Philipp. Journ. Sc. xv (1919), p. 258 (note).

* *Wendlandia paniculata* Hemsley in Journ. Linn. Soc. xxiii (1888), p. 372, vix DC.; Drake del Castello Journ. de Bot. ix (1895), p. 209, pro parte; Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 66, pro parte; Plantae Wilsonianae iii (1917), p. 392 pro parte, non DC.

CHINA.—Canton: at Sai-Chushan, West River, 26th February 1869, Sampson No. 15587 (Type of *Wendlandia uvariifolia* Hance proper); Canton, 1877, Spreng. ex Herb. W. R. Carles in Herb. Edin.; Tung Wu Shan, old Temple, in fruit, 5th July 1928, Tsiang Ying No. 790; Kwong Tung, Tsen, in fruit, April 1918, Levine No. 2338; Kwangsi, about 100 miles from Pakhoi, March 1883, Comm. G. M. H. Playfair.

Leaves ovate, bluntly acute, narrowed to the base, 9-15 cm. long, 4-9 cm. broad, sparsely strigose above, pubescent beneath, especially on the nerves. Corolla slightly shorter than in the sub-species (except sub-sp. *laotica*), calyx lobes broadly triangular to ovate, as long as the receptacle.

After a careful examination of the true *Wendlandia uvariifolia* Hance, and of the closely related species from the neighbouring provinces in China, which have been described under separate names, it is quite apparent that these represent a series of geographical forms almost identical in flower but differing somewhat in leaf shape and pubescence. *Wendlandia uvariifolia* Hance, the first to be described, takes precedence. The other forms regarded by some authors as distinct species are more closely linked to the true *Wendlandia uvariifolia* Hance, and to each other, than to the true *W. paniculata* DC. or to any other species within this sub-series. Accordingly they are

* The above synonymy refers to *Wendlandia uvariifolia* Hance proper.

best regarded as sub-species under the prior name, at any rate until the material available has been supplemented. Of this minor group almost every specimen examined is in some respects unlike any other, but all agree in having a densely hirsute calyx and relatively large ovate calyx-lobes, equalling or exceeding the length of the receptacle. In every instance the corolla is tubular—more nearly cylindrical than in *Wendlandia paniculata* DC. There is little variation in size of the anthers and length of the filaments. By these characters *Wendlandia uvariifolia* Hance and its sub-species may be distinguished from other less closely related members of the sub-series. The stipules in this minor group are relatively wide, orbicular and reflexed, the leaves are shortly and sparsely hirsute or glabrescent above and more or less softly pubescent beneath.

The type of *Wendlandia uvariifolia* Hance (Sampson No. 15587) has flowers in which the calyx lobes just equal the receptacle. The Indo-Chinese specimens from Tonkin, which Pitard has determined as *Wendlandia paniculata* DC., are identical in flower with his *Wendlandia laotica*, although they do not exactly match it in leaf. *Wendlandia laotica* Pitard (the type of which is Spire's No. 1122 from Laos) has calyx lobes slightly longer than the receptacle. *Wendlandia Dunniana* Lévl. and *Wendlandia laotica* Pitard have respectively more and less densely hirsute leaves than the true *Wendlandia uvariifolia* of Hance. The affinity of Henry's Nos. 10953 and 11479 from Yunnan is with *Wendlandia Dunniana* Lévl. but they are distinct enough to be regarded as a separate sub-species. *Wendlandia chinensis* Merr. differs somewhat from *Wendlandia uvariifolia* Hance in leaf, and its stipules are early deciduous.

It is scarcely possible to key the sub-species in this minor group and it would certainly have confused the general key to the sub-series if an attempt had been made to include them within it. The notes under each sub-species, giving contrasting characters, should be a sufficient guide for their recognition.

34. *Wendlandia uvariifolia* Hance sub-sp. *Dunniana* (Lévl.) Cowan.
Comb. nov.

Wendlandia Dunniana Léveillé in Fedde, Repert. x (1912)
434 and in Flor. du Kouy-Tcheou (1914-15), p. 373.

CHINA.—Kouy-Tcheou, Lo fou, March 1908, J. Cavalerie No. 3476.
(Type of *Wendlandia Dunniana* Lévl.); Tagmy, alt. 700-800 m.
February 1913, Esquirol No. 3538.

Leaves pubescent above, softly tomentose below, ovate, 14-22 cm.
long, 7-9 cm. broad, acuminate, cuneate at the base. Calyx lobes as
long as the receptacle.

35. *Wendlandia uvariifolia* Hance sub-sp. *yunnanensis* Cowan. Sub-sp. nov.

A typo *W. uvariifoliae* Hance calycis lobis longioribus, foliis densius pubescentibus recedit, notis caeteris appropinquat.

CHINA.—Yunnan: Mengtze, alt. 5000 ft., in mountain forests, a shrub 10 ft. high, A. Henry No. 10953; same locality, A. Henry No. 11479 (type).

Leaves pubescent above, softly tomentose below, broadly ovate, 9-15 cm. long, 6-9 cm. broad, acuminate, cuneate at the base. Calyx lobes nearly twice as long as the receptacle.

36. *Wendlandia uvariifolia* Hance sub-sp. *chinensis* (Merr.) Cowan. Comb. nov.

Wendlandia chinensis Merrill in Philipp. Journ. Sc. xv (1919), p. 257.

CHINA.—Kwangtung: Kochow region, Shek Kaw Tong, To Kang P'eng, 6th March 1919, No. 2691 (Type of *Wendlandia chinensis* Merrill), also same locality, No. 2702.

Leaves sparsely strigose above, sparingly pubescent below, 10-12 cm. long, 3-5 cm. broad, narrowed to both ends. Calyx lobes ovate, longer than the receptacle.

37. *Wendlandia uvariifolia* Hance sub-sp. *laotica* (Pitard) Cowan. Comb. nov.

Wendlandia laotica Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 64.

INDO-CHINA.—Laos: Cahn-Trap. December 1903, Spire No. 1122. (Type of *Wendlandia laotica* Pitard).

Leaves sparsely strigose above, sparingly pubescent below, 12-20 cm. long, 4.5-7 cm. broad, widest above the middle. Corolla tube somewhat as in the type proper. Calyx lobes oblong, nearly twice as long as the receptacle.

NOTE:—Pending further material I should regard the following specimens as forms of *Wendlandia uvariifolia* Hance—there is probably more than one new sub-species among them. The Indo-Chinese plants have been included under *Wendlandia paniculata* DC. by Pitard.

CHINA.—Kwangsi: Lungchou, Dolomite Hill in Jungle. Tree of 15-20 ft., flowers white, Morse No. 372. Shrub 2 cm. high, 7th March 1920, Poilane No. 1069.

INDO-CHINA.—Tonkin: Tu Phap dans les bois, a shrub of 3-4 m., May 1887, Balansa Nos. 2582 and 2583. Lac Tho, M. l'abbé Bon No. 3400 and No. 5310.

38. *Wendlandia buddleacea* F. Muell. in Descriptive Notes on Papuan Plants viii (1866), p. 45.

Wendlandia buddleana Boerlage Hand. Flor. Ned. Ind. ii (1891), p. 123.

NEW GUINEA.—On the Cloudy mountains, Rev. Jas. Chalmers; On the Astrolabe-Range, Will Armit (Argus-Expedition) (type); U-Uma River Eastern Division Papua, on river bank, 14th May 1926, L. J. Brass, No. 1429.

This species is characterised by broad reflexed stipules and a dense reddish-brown pubescence on the young stems, panicle, petioles and nerves on the under sides of the leaves. It is closely related to *W. dasythyrsa* Miq., but can be distinguished by its sparsely pubescent receptacle, acute calyx teeth with a few short hairs, and shorter corolla tube. It is said, in habit and general appearance, to resemble some of the Buddleias. I have seen only one sheet of this species, the second quoted above, in the British Museum.

39. *Wendlandia dasythyrsa* Miq. Flor. Ind. Batav. ii (1860), p. 159.

Wendlandia rufescens Miq. l.c. p. 160; Miq. Ann. iv (1869), p. 221; Boerlage in Hand. Flor. Ned. Ind. ii (1891), p. 123; Koorders et Valetton, Bijdr. Boomst. Jav. viii (1902), p. 55; Koorders et Valetton, Atlas Baumarten, Java (1915) t. 509.

Wendlandia trichantha Miq. Flor. Ind. Batav. ii (1860), p. 159.

Wendlandia densiflora Miq. l.c. p. 158 et Ann. iv (1869), p. 221; Boerlage in Hand. Flor. Ned. Ind. ii (1891), p. 123 non DC.

Wendlandia densiflora Miq. var. β *trichantha* Miq. Ann. iv (1869), p. 221; Boerlage l.c. p. 123.

Wendlandia luzoniensis Miq. Flor. Ind. Batav. ii (1860), p. 159, non DC.

JAVA.—Pajittan, Horsfield in Herb. Brit. Mus.; Mount Gede ex Herb. T. Horsfield in Herb. Kew.; By Poedak, Maduin, Teysmann; Maduin, Miquel in Herb. Kew.; Maduin, Koorders No. 6893 β ; Maduin, Koorders No. 29373 β ; Preanger, Koorders No. 6881 β ; Ngadisari, Koorders No. 37763 β ; without precise locality, Koorders No. 37796 β , in Herb. Kew.; without precise locality, Koorders No. 38668 β , in Herb. Kew.; without precise locality, De Vries in Herb. Kew.

BORNEO.—Kirabalu, Kion, alt. 3000 ft., shrub or small tree, corolla white, Dr. G. D. Havaland No. 1366.

This species, a small branched tree with grey bark and white, fragrant flowers, is fully described by Koorders and Valetton.

It is characterised by very broad, orbicular, reflexed stipules. The inflorescence, the prominent nerves on the underside of the leaves and the petioles are densely greyish-brown pubescent. The leaves when

dried are reddish-brown. The corolla is hairy in the throat and externally glabrous, or with a few hairs on the tube. Comparing the species with *W. paniculata* DC., the corolla is longer, the anthers are more elongated, their filaments are longer, and the calyx is densely pubescent, with lobes shorter than half the length of the receptacle in this species. I am unable to separate *W. dasythyrsa* Miq. from *W. rufescens* Miq. and the earlier name takes precedence though the latter is more apt.

There has been a good deal of confusion with regard to this species. Miquel, himself, after describing *W. dasythyrsa* and *W. tricantha*, reduced both to *W. densiflora* DC. Why he should have done so is not clear, since the stipules of *W. densiflora* DC. are pointed and not reflexed, and this was observed by him, as Koorders and Valetton have remarked. *W. tricantha* Miq. is merely a form with a few hairs on the outside of the corolla tube. The flowers otherwise exactly resemble those of *W. dasythyrsa* Miq.

40. **W. Williamsii** Merrill in Philipp. Journ. Sc. x (1915), p. 101.

PHILIPPINE ISLANDS.—Mindanao, Williams 2804.

I have not seen the type of this species, but the long corolla which Merrill describes as "much longer than that of *W. rufescens* Miq.," would suggest the close affinity of this species with *W. luzoniensis* DC. In leaf and as regards pubescence this species is apparently very similar to *W. rufescens* Miq. and has broad stipules. The only plant that I have seen from the same locality (Elmer's No. 10552) does not well agree with Merrill's description of *W. Williamsii*, and it also differs somewhat from the typical *W. luzoniensis* DC.

41. **Wendlandia paniculata** (Roxb.) DC. Prod. iv (1830), p. 411; Don, Gen. Syst. iii (1834), p. 518; W. et A. Prod. i (1834), p. 402 (note); Steud. Nom. Bot. (1841), p. 786; Miq. Flor. Ind. Batav. ii (1860), p. 158; Hook. f. Flor. Ind. iii (1882); p. 39, pro parte vix DC.; Schum. et Laut. Flor. Deutsch. Schutzg. (1901), p. 549, pro parte vix DC.; Merrill in Philipp. Journ. Sc. xv (1919), p. 258 (note).

Wendlandia paniculata DC. var. *genuina* Valetton in Engler's Bot. Jahrb. lx (1925), p. 4.

Rondeletia paniculata Roxb. Hort. Beng. (1814), p. 15; Flor. Ind. ii (1824), p. 133; Wall. Cat. No. 6266A (the upper specimen only).

INDIA.—Cultivated in the Royal Botanic Garden, Calcutta, Wall. 6266A (type); several unnumbered specimens also No. 1064, Kurz ex Hort. Bogor. in Herb. Calcutt.; Amboyna, 1796, Christian Smith No. 284; Amboyna, Soja, 1893, Treub No. 373.

The type of *W. paniculata* DC. grown in the Royal Botanic Garden,

Calcutta from Amboyna seed, is characterised by a spreading panicle, flowers with trumpet-shaped corollas 3 mm. long, with strigose hairs projecting at the corolla mouth. The calyx is sparsely strigose-pubescent and the lobes are shortly triangular. The stipules are orbicular and reflexed, wider than the branches. The leaves are very shortly petioled (circa 0.5 cm.), are practically glabrous above and have a few strigose hairs on the nerves below. The type sheets are in the Herbaria at Kew, Calcutta and Edinburgh, and syn-types are probably to be found in Buitenzorg. Sheets of the same species collected in Amboyna are in the British Museum and at Kew. See also pages 234, 235, 283.

42. *Wendlandia scabra* Kurz in Journ. Asiatic Soc. Bengal xii (1872), p. 310, For. Flor. Brit. Burma ii (1877), p. 73.

Wendlandia puberula Hook. f. in Flor. Brit. Ind. iii (1882), p. 38, pro parte non. DC.

Wendlandia paniculata Hook. f. l.c. pro parte, vix DC.; Brandis, Ind. Trees (1906) p. 374, pro parte.

Wendlandia paniculata DC., sub-sp. *scabra* Cowan in Craib, Fl. Siam. Enum. ii pt. 1 (1932), p. 22.

INDIA.—East Bengal: Noakoli, April 1821, Wall. Cat. No. 6267 pro parte in Herb. Calcutt. (this sheet has also the word Nepal written upon it); 6267B pro parte in Herb. Calcutt. et Kew et Edin.

Assam: Sylhet, Wall. Cat. No. 6269 pro parte in Herb. Calcutt.; Limatak, Cachar and Manipur, alt. 4000 ft., 27th May 1882, G. Watt No. 7319; Poishing, alt. 4000 ft., 25th April 1882, G. Watt No. 6734; Ching Sow, alt. 7000 ft., a small bush, 14th April 1882, G. Watt No. 6507.

BURMA.—Kachin Hills, Namlao to Bausparao, alt. 500 to 2000 ft., 23rd March 1897, E. Pottinger sine no; Myitkyna, Nan Ma Reserve, 2nd April 1929, Sukoe No. 9244; Ava, Ruby Mines, a plant 10-12 ft. high, March 1891, Abdul Huk No. 215; same locality, a plant 15-20 ft. high, March 1892, Abdul Huk No. 8; Mandalay Road, Maymyo, alt. 3500 ft., 2nd April 1915, A. Rodger No. 261; Chin Hills, alt. 4000 ft., 18th April 1916, V. H. T. Fields Clarke No. 18; Chin Hills? S. Toppin No. 3198; Tsanda, 15th May 1868, D. J. Anderson sine no; Locality illegible, 4th August 1837, Herb. Griffith Kew Distrib. No. 2837; Keng Tung, R. W. MacGregor No. 176.

SIAM.—Payap: Chiengmai, Doi Nang Ka, 23rd April, 1931, Put No. 3744 and No. 3747; Chiengmai, Doi Nang Ka, 27th April 1931, Put No. 3799; Chiengmai, Doi Ka, alt. circa 4000 ft., a shrub or small tree, flowers white, scented, evergreen forest, 7th April 1925, Winit No. 1361; Doi Sutep, alt. 2000 ft., a tree about 30 ft. high, flowers white, mixed jungle, 22nd March 1911, A. F. G. Kerr No. 1710; Doi

Sutep, alt. 2000 ft., a small tree about 20 ft. high, flowers white, mixed jungle, 28th March 1911, A. F. G. Kerr No. 1715.

Maharat : Doi Wao, alt. 1000 ft., a small tree about 20 ft. high, evergreen jungle, 23rd February 1912, A. F. G. Kerr No. 2428 ; Loi, Kao Krading, alt. c. 4000 ft., a tree c. 20 ft. high, flowers white, open evergreen forest, 12th March 1924, A. F. G. Kerr No. 8706.

Pitsanulok : Sokotai, Kao Luang, alt. c. 3000 ft., open grassy forest, a small tree about 20 ft. high, flowers white, 2nd May 1922, A. F. G. Kerr No. 5920 ; Puket, Pang-nga, Kao Bangto, alt. c. 3000 ft., evergreen forest, a tree about 75 ft. high, 23rd February 1929, Dr. A. F. G. Kerr No. 17217 ; Krabi, Panom Bencha, alt. c. 2000 ft., evergreen forest, a tree about 50 ft. high, 26th March 1930, A. F. G. Kerr No. 18678 ; Trang, Kao Sung, alt. c. 3000 ft., open evergreen forest, a tree about 25 ft. high, flowers white, 17th April 1928, A. F. G. Kerr No. 15271 ; Satul, Kao Keo Range, alt. c. 2000 ft., evergreen forest, a tree about 25 ft. high, flowers white, 16th March 1928, A. F. G. Kerr No. 14564.

CHINA.—Yunnan : Salwin Valley, lat. 25° 5' N., alt. 3000 ft., a shrub of 9-15 ft., flowers creamy white, fragrant, moist situations amongst scrub, April 1910, G. Forrest No. 5506.

This species from Assam, Burma and Siam differs from *W. paniculata* DC., the Amboyna plant, in several ways. Its calyx lobes are hairy, stipules smaller, and the leaves are more or less rough with scabrid hairs above, and pubescent with longer, softer hairs below. The roughness of the upper surface of the leaf is a character by which this species can usually at once be distinguished. From *W. wariifolia* Hance, with which it is probably most closely allied, it differs mainly by having shorter calyx lobes and narrower stipules. The hairs within the corolla tube of *W. scabra* Kurz are short and, as a rule, confined to the middle portion of the tube. In both *W. paniculata* DC. and *W. wariifolia* Hance, these hairs are longer, are situated in the upper third of the tube and project at the mouth of the corolla.

The Chin Hill plants Toppin 3198, Fields Clarke No. 18, and Watt No. 6734 from Poishing have longer filaments and somewhat shorter flowers than normal Burmese plants.

Specimens under Wall. Cat. 6267B and 6269B pro parte are probably *W. scabra* Kurz. The former are said to be from Nepal, the latter from Cherapungi in Assam. This collection (Wall. Cat. 6267B) is the only record of *W. scabra* Kurz occurring further west than Assam, and it is not unlikely that the specimens, there noted as from Nepal, have in error been moved from 6269B and may be actually from Assam. This is the more probable since one sheet is inscribed Noakali (Bengal) as well as Nepal (see pp. 308-309).

42A. var *dependens* Cowan. Var. nov.

W. paniculata in Notes R. B. G. Edin. xvii (1929), p. 7, vix DC.

A typo panicula laxiore dependente, corolla patentiore, foliis supra fere glabris infra sparsim strigosis satis diversa.

YUNNAN.—Taping Valley, lat. $24^{\circ} 30' N.$, alt. 2000 ft., a shrub of 6-20 ft., flowers creamy-white, in open jungle, April 1917, G. Forrest No. 13633 (type); Hills to the west of Teng-Yueh, lat. $25^{\circ} N.$, alt. 6-7000 ft., a shrub of 6-10 ft. flowers creamy-yellow, fragrant, open scrub, March 1913, G. Forrest No. 9805.

This variety differs from the type by having a laxer panicle in the same manner as *W. thyrsoidea* Steud. differs from var. *Lawii*.

43. *Wendlandia brachyantha* Merrill in Philipp. Journ. Sc. i. Supp. i (1906), p. 128.

PHILIPPINE ISLANDS.—Bataan, Luzon, Lamo River, Mt. Mariveles, July 1904, H. N. Whitford No. 449 (type); Pampanga, Luzon, Mt. Arayat, May 1904, Elmer D. Merrill No. 3834; Luzon, Laguna, Los Banos (Mt. Maquiling), June-July 1917, A. D. E. Elmer No. 17880 and No. 18272.

This Luzon species is very easily distinguished from *W. luzonensis* DC. and most readily recognised by its very short flowers. The tube of the corolla in the type is about 2 mm. long, only twice the length of the reflexed lobes. The lanceolate calyx lobes are nearly as long as the pubescent receptacle. The ovate leaves, 9-12 cm. long by 3-5 cm. broad, are very different from those of *W. paniculata* DC. The midrib and lateral nerves are prominent below and pubescent. The stipules which are described as entire are early deciduous. On the type sheet the one remaining stipule appears to have had its tip broken off, but Elmer's collections show the stipules to be rounded and reflexed.

44. *Wendlandia tonkiniana* Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 67.

INDO-CHINA.—Tonkin: Latson, buissons de Dong-ham, Vox-ru rochers du Mount Hac, Kienké aux collines Dong-ban, Bon Nos. 3034 and 3435.

This species resembles *W. tinctoria*, sub-sp. *orientalis* in foliage, and as far as can be judged from the specimens, the flowers are similar although smaller. The stipules, however, have a rounded, reflexed tip.

45. *Wendlandia nobilis* Geddes in Kew Bull. (1931), p. 210.

Wendlandia paniculata DC. sub-sp. *nobilis* Cowan in Craib, Fl. Siam. Enum. ii, pt. 1 (1932), p. 22.

SIAM.—Maharat, Nan, Doi Pu Ka, c. 1700 m., savannah on ridge, a small tree c. 8 m. high, 26th February 1921, A. F. G. Kerr No. 4931 (type).

This species is very closely allied to *W. scabra* Kurz, which it resembles in flower, although the calyx is less hirsute. The leaves are, however, lanceolate and practically glabrous.

46. *Wendlandia luzoniensis* DC. Prod. iv (1830), p. 412; Don, Gen. Syst. iii (1834), p. 518; Steud. Nom. Bot. (1841), p. 786; Merrill Species Blancoanae (1918), p. 359.

Wendlandia multiflora Barth. ex DC. Prod. iv (1830), p. 412.

Wendlandia exserta Blanco Flor. Filip. ed. 2 (1845), p. 104, ed. 3, i (1877), p. 191, t. 302, non DC.

Wendlandia paniculata Hook. f. Flor. Brit. Ind. iii (1872), p. 39, pro parte; Atlas (1883) t. 56, Fig. H, Vidal Sin. Fam. et Gen. P. Len. Filip.; Pitard in Flor. Gén. de l'Indo-Chine iii (1922), p. 66, pro parte.

Wendlandia membranifolia Elmer, Leaflets Philipp. Bot. i (1908), p. 385.

Rondeletia asiatica Blanco, Flor. Filip. (1837), p. 146, non Linn.

PHILIPPINE ISLANDS.—Luzon: Bulacan, Mts. Angat, October 1882, S. Vidal No. 374; Rizal, Antipolo, February 1903, Elmer D. Merrill No. 1309; Rizal, Montalban, February 1914, Elmer D. Merrill, Species Blancoanae No. 233; Rizal, March 1913, A. Loher No. 14289; Rizal, Bosoboso, June 1904, Ahern's Collector, Forestry Bureau No. 1142; N. Luzon, Pina Blanca, 1888? O. Warburg No. 12070; Cagayan, March 1909, F. W. Darling No. 14770; Mala Sambang, A. Loher No. 6341; Pinagluho (Zambales) A. Loher No. 6383; Battan, April 1918, V. Sajor No. 27127.

Island of Culion: February 1903, Elmer D. Merrill No. 662.

Negros Island: Negros Oriental, Dumaguete (Cuernos Mts.), March 1908, A. D. E. Elmer No. 9442.

Palawan Island: Puerto Princesa (Mt. Pulgar), March 1911, A. D. E. Elmer No. 12748.

Although closely allied to *W. paniculata* DC. this species can be readily distinguished from it and from *W. dasythyrsa* Miq. by its longer corolla tube with relatively short corolla lobes. In the various islands of the Philippine group there appears to be a considerable number of forms of this species, scarcely differing from typical *W. luzoniensis* DC. in flower, but varying as to the shape of their leaves and denseness of hairs upon the under sides. Two forms at the extremes of the series stand out as rather more distinct and may be regarded as varieties.

- 46A. Var *membranifolia* (Elmer) Cowan. Comb. nov.

Wendlandia membranifolia Elmer, Leaflets Philipp. Bot. i (1908), p. 358.

PHILIPPINE ISLANDS.—Luzon: Province Barget, Baguio, March 1907, Elmer No. 8946.

This variety can be distinguished by the denser pubescence on the leaves, panicle and calyx, and the more abruptly acute or acuminate apex of the leaves.

46B. Var *syringoides* Cowan. Var. nov.

Varietas ad typum *Wendlandiae luzoniensis* DC. spectans sed foliis receptaculoque haud pubescentibus, panicula vix puberula, notisque aliis diversa.

PHILIPPINE ISLANDS.—Luzon: Zambales Province, December 1923, D. Antonio No. 29540 (type); Albany Province, Cumming No. 1102.

Contrary to the preceding variety, this differs from typical *W. luzoniensis* DC. by being practically glabrous. The leaves are somewhat smaller and the flowers slightly larger than those of the typical form.

47. *Wendlandia andamanica* Cowan. Sp. nov.

Species affinis *Wendlandiae paniculatae* DC. ejusque sociis sed foliis glabris nitentibus longe attenuatis, stipulis anguste orbicularibus reflexis, calycis lobis longioribus dignoscenda.

Arbor parva; ramuli tenuiores, minute puberuli tandem glabri, plus minusve sulcati vel teretes, leviter striati. Folia 11-18 cm. longa, 4-7 cm. lata, elliptica vel elliptico-ovata vel latiuscule ovata, utrinque attenuata, apice sensim nunc fere abrupte acuminata vel subacuminata nonnunquam lateraliter detorsa, supra atroviridia lucida subtus fusca in juventute (praesertim ad nervos 10-11-aria) rarius obscureque pilis instructa, in maturitate omnino glabra, ad marginem recurvata, basi cuneata. Petiolus 1-2 cm. longus, satis robustus, aliquantum complanatus laminam versus paulo alatus. Stipulae orbiculares reflexae coriaceae glabrae ad 8 mm. latae. Inflorescentia terminalis, folia plus minusve aequans, ramis divergentibus minute ferrugineo-pubescentibus. Bracteae inferiores lanceolatae nunc petiolatae ad 2 cm. longae, superiores lineares. Flores 1-2-rarius 3-fasciculati, bracteolis spathulatis basi nonnunquam calcaratis receptaculo brevioribus nunc paulo longioribus. Receptaculum ovoideum exigue pubescens, calycis lobis subglabris triangularibus acutis vix receptaculum aequantibus. Corollae tubus fere cylindricus, 4 mm. longus, fauce albedo-hirsutus lobis obtusis reflexis tubo 3-4-plo brevioribus. Antherae ovoideae filamenta duplo superantes. Stigma exsertum bifidum lobis anguste obovatis. Capsula globosa; semina minutissima nonnunquam obscure alata.

ANDAMAN ISLANDS.—Mount Haoriatt, alt. about 900 ft., 16th March 1916, C. E. Parkinson No. 1107 (type); Mount Haoriatt, Port Blair, a tree about 20-30 ft. high and 2-3 ft. in circumference, flowers brownish white, fragrant, 31st March 1884, Dr. King's Collector No. 201;

Carkachund, Port Blair, 22nd May 1884, Dr. King's Collector sine no in Herb. Calcutt.

A species probably confined to the Andamans and easily distinguished from its nearest allies by its glabrous (or almost glabrous) elliptic to elliptic-ovate, tapering leaves, relatively long calyx lobes and glabrous orbicular stipules. Its affinity is undoubtedly with the true *W. paniculata* DC. It can be readily separated from *W. Wallichii* W. et A., with which it has been confused, by its longer corolla tube, short ovoid and much less exerted anthers.

48. *W. Lauterbachii* Valetton Beiträge zur Flora von Papuasien, in Engl. Bot. Jahrb. lx (1925), p. 4, 6.

KAISERWILHELMSLAND.—Alt. 250 m. Hoher Strauch in den Waldern am Kaulo, 9th April 1908, R. Schlechter No. 17525 (type).

Very closely allied to the true *W. paniculata* DC. this species may be distinguished by its longer petioled leaves, rufous pubescence, and longer inflorescence. It differs from *W. arborescens* in the shape of its leaves, and is much less densely pubescent than *W. buddleacea*, while from the latter species it also differs in the shape and relative size of its flowers.

49. *Wendlandia arborescens* Cowan. Sp. nov.

Wendlandia paniculata Brandis, Ind. Trees (1906), p. 374, pro parte.

Arbor 20-27 m. alta, trunco ambitu ad 1 m. (ex Kunstler); ramuli juniores teretes, nunc subquadrangulares dense ferrugineo-pubescentes. Folia atroviridia obovata vel anguste obovata apice plus minusve abrupte obtuseque acuta, basi late cuneata vel subtruncata supra ad costam insculptam praesertim basim versus dense puberula, caeterum glabra in sicco fere nigrescentia, subtus fusca, ad nervos prominentes 12-14-paria rufo-pubescentia venulis reticulatis haud dense sed distincte hirsutulis. Petiolus robustus circa 1.5 cm. longus canaliculatus satis dense pubescens. Stipulae reflexae apice rotundatae, nonnunquam emarginatae, circa 5 mm. latae, ad imum dilatatae, extra puberulae intus fulgidae glabrae. Inflorescentia repanda ad 35 cm. longa, ramis ascendentibus dense ferrugineo-pubescentibus; bractee inferiores valde foliaceae petiolatae, superiores minutae lineares. Flores plerumque 3-fasciculati ad ramos interrupte dispositi. Corolla tubiformis circa 3 mm. longa, fauce albido-hirsuta lobis rotundatis tubo triplo brevioribus. Receptaculum glabrum vel obscure puberulum, calycis lobis minutis late et obtuse triangularibus. Antherae parvae oblongae vel ovoidae sessiles. Stigma bifidum, valde exsertum. Fructus non visus.

MALAYA.—Perak: Larut, alt. 300-400 ft., April 1882, Dr. King's Collector et H. Kunstler No. 2947.

This species is very closely related to the true *W. paniculata* DC. It differs from it in the texture of its leaves and by its indumentum, while the corolla is more tubular and the calyx lobes are more rounded. From *W. Burkillii* it differs by having a shorter corolla tube, larger leaves, and in its indumentum. The two Malayan species are closely allied but the characters given above, together with the different habit, are sufficiently distinguishing marks.

50: **Wendlandia Burkillii** Cowan. Spec. nov.

Arbor parva vel frutex 5-7 m. altus (ex Haniff); rami hornotini quadrangulares, profunde sulcati, annotini subteretes leviter striati rufo-brunnei, mox glabrescentes. Folia membranacea ovata vel latiuscule ovata, usque ad 14 cm. longa, 8.5 cm. lata, apice plus minusve abrupte acuta vel breviter acuminata, basi late nunc angustius cuneata, utrinque glabra vel infra ad nervos sparsim setulosa, supra in sicco brunneo-rufescentia, nervis 8-11-paribus distincte impressis ad marginem recurvatis fere anastomosantibus, venulis inconspicuis, subtu pallidiora nervis elevatis. Petiolus gracilis canaliculatus circa 1.5 cm. longus. Stipulae brevi-stipitatae, ramis paulo angustiores, apice rotundatae reflexae, minute et laxe puberulae, costa media supra impressa infra prominente munitae. Inflorescentia ampla, ramis floribusque (nisi ad apicem) haud confertis, ad 15 cm. longa, 20 cm. diametro; bractee lineari-lanceolatae, ad 1 cm. longae, bracteolis ovatis pubescentibus receptaculum vix aequantibus. Calyx ad tertiam partem in lobos 5 plus minusve obtuse rotundatos divisus, longiuscule griseo-pubescentis, ad apicem receptaculi contractus. Corolla basi breviter inverso-infundibularis, sursum usque ad os cylindrica, fauce albido-hirsuta; tubus 4 mm. longus, lobis 3-4-plo brevioribus. Antherae oblongae, fere sessiles. Stylus valde exsertus, apice in lobos duos late triangulares divisus. Fructus deest.

BURMA.—Thaton, Kalama Reserve, Kyaik-thinbaw, a tree 10 feet high, flowers white, Ba Pe No. 4676; Amherst, Dawnas near Mulayit, Shwe Nyan Tha No. 11.

MALAYA.—Perak: Taiping Hill, alt. 4100 ft., 4th February 1917, Md. Haniff No. 2349; B. Birch, alt. 4400 ft., October 1899, M. Fox No. 187; Birch's Hill, alt. 3800 ft., 29th February 1924, H. Burkill et Haniff No. 12854 (type).

A species easily distinguished from *W. paniculata* DC. by its smaller, ovate, distinctly and slenderly petioled leaves. From *W. scabra* it is separated by the texture and shape of the leaves, which are glabrous above, its less dense panicle and shortly pubescent calyx teeth. From *W. andamanica* it differs in the shape and size of the leaves as well as in the flower.

51. **W. rotundifolia** Hand.-Mazz. in Anz. Akad. Wiss. Wien, Math. Nat. lix (1922), p. 112.

CHINA.—Kwangtung: In monte Dingwu-schan ad occ. urbis Kanton cur. 26 III 1918, Mell No. 208.

From the description this species appears to be very closely allied to *W. wariifolia* Hance, of which it is perhaps only a sub-species. It differs in the leaf and has a narrower stipule, and the corolla tube and calyx lobes are somewhat shorter in this species. I have not seen the type.

52. *Wendlandia Augustinii* Cowan. Sp. nov.

Species affinis *Wendlandiae paniculatae* DC. a qua habitu, panícula multo brevior, foliis ellipticis vel anguste ovatis, stipulis multo minoribus inter alia signa recognoscitur.

Frutex 2-3 m. altus, erectus; ramuli graciles brunneo-pubescentes. Folia superiora tantum visa usque ad 13 cm. longa, 4 cm. lata, chartacea, elliptica vel elliptico-ovata, apice nonnihil acuminata basi cuneata, supra setis albidis falcatis plus minusve brevi-hispida demum glabrescentia, infra (saltem ad costam) pilis flexilibus oblecta, nervis 8-9-paribus, petiolo 5-10 mm. longo. Stipulae coriaceae, persistentes, medio constrictae apice orbiculares 3-4 mm. latae sparsim hirsutae. Inflorescentia terminalis dense pubescens vix ad 12 cm. longa bracteis linearibus pubescentibus. Flores albidi satis numerosi, 1-3-fasciculati, sessiles vel nunc brevi-pedunculati, ex axillis bracteolarum inconspicuarum enati. Tubi corollini omnino glabri 5 mm. longi pars inferior cylindrica, superior apud os paulo dilatata; lobi ovati tubo 6-8-plo breviores. Calyx vix 1 mm. longus sparsim pubescens ad tertiam partem in lobos triangulares fissus. Antherae oblongae filamenta bis superantes. Stylus apice bilobus breviter exsertus. Fructus deest.

CHINA.—Yunnan: Szemao, Western Mountains, alt. 5000 ft., a shrub of 10 feet, A. Henry No. 11773A, (type); Szemao hills, alt. 5000 ft., a shrub of 8 feet, A. Henry No. 11773.

The contracted inflorescence, the long corolla tube compared to the length of the lobes and the small, sub-scabrid leaves well distinguish this species.

53. *Wendlandia nervosa* Merrill in Philipp. Journ. Sc. iii (1908) p. 263.

PHILIPPINE ISLANDS.—Luzon: Province of Zambales, Mount Tapulao, December 1907, Ramos No. 5007 (type) (non vidi).

From the description this species should be easily recognised by its congested inflorescence, long calyx lobes which are twice the length of the receptacle, and by its small sub-sessile, very strongly nerved leaves.

54. *Wendlandia erythroylon* Cowan. Sp. nov.

Species ex affinitate *Wendlandiae paniculatae* DC. a qua inter alia lobis calycis majoribus ovatis chartaceis receptaculum superantibus facile distinguitur.

Arbor circa 7 m. alta cujus lignum durum atque rubrum; ramuli robusti fusco-cinerascentes pubescentes. Folia coriacea elliptico-ovata vel ovata, 9-12 cm. longa, 4.5-5.5 cm. lata, subintegra, margine hic illic minutissime denticulata, denticulo quoque pilo unico inflexo apicem ornato, supra costa insculpta puberula, caetera paululo puberula vel glabrescentia, infra tantum ad nervos parce hirsuta, petiolo fere ad 8 mm. longo. Stipulae interpetiolares apice in foliolum orbiculare demum reflexum expansae. Inflorescentia pubescens; flores ad extrema ramorum praesertim congregati. Bractee lineares vel lanceolatae, inferiores circa 2 cm., ultimae vix 4 mm. longae, plerumque basi hastatae; bracteolae glabrae plus minusve dentatae, calcaratae, calycem aequantes. Calyx omnino glaber (nisi ad basin receptaculi nunc parce pilosum), lobis ovatis vel ovato-triangularibus membranaceis acutis vel subacutis receptaculum superantibus. Corolla tubiformis, apud os vix dilatata, 3 mm. longa, fauce albido-hirsuta, lobis ovatis 2-3-plo brevioribus. Antherae parvae ovoideae filamentis brevibus. Stylus bilobus distincte exsertus lobis rotundatis. Fructus deest.

FORMOSA.—Bankinsing, vern. *Lung Mu* (i.e., red wood), a tree of 20 feet, very hard wood, April 1895, A. Henry No. 125, (type).

This very distinct species is easily recognised by the large ovate lobes of the calyx, longer than the receptacle. The sparsely ciliate margins of the leaves are also distinctive.

55. *Wendlandia sibuyanensis* Cowan. Sp. nov.

Species ex affinitate *Wendlandiae andamanicae* Cowan a qua calyce glabro distinguitur.

Arbor pro maxima parte glabra; rami juniores subquadrangulares, rubicundi, cortice longitudinaliter plus minusve plicato. Folia chartacea elliptico-lanceolata vel elliptica vel elliptico-ovata, utrinque sensim attenuata, 13-20 cm. longa, 5-6 cm. lata, supra costa (praesertim in parte inferiore) impressa, infra costa nervisque 12-14-paribus prominentibus minutissime hirsutulis, caetera glabra, apice obtuse acuta, basi in petiolum robustum brevem (vix 5 mm. superantem) plus minusve oblique alatum sensim attenuata vel paene sessilia. Stipulae apice orbiculares 5 mm. latae reflexae. Panicula glabrescens, circa 15 cm. longa, 10 cm. diametro; bractee infimae lanceolatae, circa 1.5 cm. longae, apice obtusae, superiores circa 2-4 mm. longae, ovatae vel brevi-spathulatae, basi plus minusve auriculatae, extra praesertim ad basim mediumque hirsutulae, caeterum glabrae. Flores sessiles vel brevi-pedunculati plerique singulariter dispositi, bracteolis subulatis

receptaculum vix aequantibus. Calyx glaber lobis late triangularibus acutis vel subacutis receptaculo 4-5-plo brevioribus. Corolla infundibuliformis circa 3 mm. longa, ad os 2-3 mm. lata, deorsum valde contracta, fauce glabra, lobis ovatis 3-4-plo longior. Antherae oblongae vix 1 mm. longae subsessiles. Stigma exsertum bifidum lobis obtuse lanceolatis. Fructus non visus.

PHILIPPINE ISLANDS.—Capiz, Megallanes (Mt. Giting-Giting), Island of Sibuyan, April 1910, A. D. E. Elmer No. 12345, (type).

This easily distinguished species may be at once separated from *W. glabrata* DC., with which it has been confused, by its rounded stipules.

56. *Wendlandia Junghuhniana* Miq. Flor. Ind. Batav. ii (1860), p. 159; Miq. Ann. iv (1869), p. 221; Boerlage, Handl. Flor. Ned. Ind. ii (1891), p. 123; Koorders et Valetton, Bijdrage Boomsort, Jav. viii (1902), p. 57; Koorders et Valetton, Atlas Baumarten Java (1915), t. 508.

JAVA.—Banqumar, 1901, Koorders No. 39088 B.

Wendlandia Junghuhniana Miq. from Java, is very closely allied to the true *W. paniculata* DC. from Amboyna. It should perhaps be regarded only as a geographical form of that species. Moreover, *W. Junghuhniana* resembles also the Perak plant *W. arborescens*, although it is nearer to the true *W. paniculata* DC.

It seems better for the present not to unite these species, at least until specimens from Sumatra and the islands which link Amboyna with the Malayan Peninsula have been studied. The Andaman plant is certainly distinct.

In *W. Junghuhniana* the bracts are lanceolate and as long as the calyx, the calyx lobes are usually somewhat sharply acute, the receptacle is glabrous, or with a few hairs only, the leaves are pubescent at least on the main and secondary leaves below.

W. paniculata DC. has ovate bracts, shorter than the calyx, the lobes of which are more or less rounded, the receptacle is sparsely pubescent, rarely quite glabrous; the leaves are almost glabrous with a few hairs on the main nerves.

W. Burkillii differs by having ovate bracts, the calyx lobes are longer and the receptacle is pubescent. The leaves are more ovate and longer petioled.

The pubescent underside of the leaves, pubescent calyx, and the shape and size of the corolla of *W. dasythyrsa* Miq. readily distinguish it from this species.

The orbicular reflexed stipules of *W. Junghuhniana* prevent any possibility of confusing it with *W. glabrata* DC.

SERIES III—MONTIGENAE.

The two species in this series are dwarf or prostrate alpine shrubs. The flowers are arranged in terminal and sub-terminal corymbs so that the inflorescence is much more compact than in other members of the genus. Both species are unique among *Wendlandias* in having small leaves, not exceeding 4 cms. in length. The stipules are cuspidate.

The outstanding characteristic of the flowers is the exceptionally long exerted anthers. As far as can be ascertained the ovary is quite typical of the genus.

In the light of further information regarding *Wendlandia* and allied genera these species may have to be regarded as a separate genus which may possibly also include *W. Kotschyii* Boiss.

Key to the Species.

- A. Calyx lobes linear, twice the length of the receptacle. Leaves acute. 57. *W. longidens* (p. 301).
 B. Calyx lobes triangular, shorter than the receptacle, leaves rounded. 58. *W. subalpina* (p. 302).

57. *Wendlandia longidens* (Hance) Hutch. in Sargent, *Plant. Wils.* iii (1916), p. 392.

Hedyotis longidens Hance in *Journ. Bot.* xx (1882), p. 289.

Wendlandia Henryi Oliver in *Hook. Icon. Pl.* viii (1887), t. 1712; Hemsley in *Journ. Linn. Soc.* xxiii (1888), p. 372; Pritzl in *Englers Bot. Jahrb.* xxix (1901), p. 580.

CHINA.—Hupeh: A. Henry, No. 317, (type), also (1885-88) No. 4101; Ichang, A. Henry No. 2269 (et fide Oliver Nos. 603, 1619); Ichang, alt. 100-1000 ft., in glens, bush 1-5 ft. high, flowers white, June 1907, E. H. Wilson No. 2359. Szechuan: Chungking, Yangtze-Kiang, small shrub, E. Faber No. 2; Yangtze river banks, shrub 0.75-1.25 m. tall, flowers white, fragrant, Veitch Expedition No. 3756 (fide Hutchinson); Feng-Ksiang gorge, E. Faber No. 578; "Above Fu City" E. Faber No. 638; Western China: Without precise locality, 1914, E. E. Maire No. 326.

A low shrub, up to 1.5 metres in height, with small, ovate, acute, almost sessile leaves. These are sparsely covered on the upper side with minute strigose hairs scarcely visible to the naked eye, and have similar but longer hairs on the mid-rib and nerves on the under side. The stipules are triangular and pointed. The panicle is compact, the flowers being clustered at the ends of the branches. The receptacle is sparsely hairy. The lobes of the calyx are linear or more or less spatulate, twice as long as the receptacle. The

narrow corolla lobes are as long as the corolla tube, the stamens and stigma are very much exserted. By these outstanding characters, this distinct species can very easily be recognised.

58. *Wendlandia subalpina* W. W. Smith in Notes Roy. Bot. Gard. Edin. ix (1916), p. 142.

CHINA.—Yunnan: Mountains in the N.E. of the Yangtze bend, lat. $27^{\circ} 45' N.$, alt. 11-12,000 ft., dwarf prostrate shrub of 1-1½ ft., flowers white, in open stony pastures and on cliffs, July 1913, G. Forrest No. 10378; Yung-pe Mountains, lat. $26^{\circ} 45' N.$, alt. 9000 ft., shrub of 1-2 ft., in fruit, in open dry situations, September 1913, G. Forrest No. 10999; Mountains of the Chungtien plateau, lat. $27^{\circ} 30' N.$, alt. 9000 ft., shrub of 2-4 ft., flowers creamy-yellow, on the ledges of cliffs and on humus covered boulders, June 1914, G. Forrest No. 12617; Da-gu Shan, lat. $27^{\circ} 40' N.$, alt. 10,000 ft., shrub of 1-2 ft., in fruit, in open dwarf scrub, October 1918, G. Forrest No. 17085; Western flank of the Lichiang Range, lat. $27^{\circ} 40' N.$, alt. 7000 ft., dwarf shrub of 4-9 inches, flowers creamy-yellow, on dry stony pastures, May 1922, G. Forrest No. 21189.

An alpine or sub-alpine prostrate shrub, 1-2 ft. high with the habit of *Cotoneaster microphylla*. The stipules are small, triangular and cuspidate, rarely bicuspidate. The inflorescence is compact. This species has much exserted anthers and style, but the whole flower is smaller than in *W. longidens* Hutch. The style and anthers are about half as long as in *W. longidens* and the calyx lobes are triangular or lanceolate, not linear or spatulate.

SERIES IV—CLAVIGERAE.

There is only one species belonging to this series, and when in flower it may be easily recognised by its clavate stigma. In habit it is an elegant but somewhat straggly shrub with slender branches.

59. *Wendlandia pendula* (Roxb.) DC. Prod. iv (1830), p. 412; W. et A. Prod. i (1834), p. 402; Don, Gen. Syst. iii (1834), p. 519; Steud. Nom. Bot. (1841), p. 786; Hook. f. Flor. Brit. Ind. iii (1882), p. 40; Brandis, Ind. Trees (1906), p. 374; Wall. Cat. No. 6275.

Rondeletia pendula Roxb. Flor. Indica ii (1824), p. 140.

INDIA.—Assam: Manipur, Kassome, alt. 3500-4000 ft., 10th January 1882, G. Watt No. 5111; Muku, alt. 3000 ft., 8th January 1882, G. Watt No. 5069; On the way from Nungba to Lingli, alt. 5000 ft., 6th January 1882, G. Watt No. 6671; Naga Hills, Myring, alt. 4000 ft., December 1907, sine Coll. No. 7214.

NEPAL.—Wall. Cat. No. 6275 (type).

BHUTAN.—Torsa Valley, alt. 5000 ft., 6th December 1911, W. R.

Jacob No. 125; Torsa, alt. 3-4000 ft., 1904, G. L. Searight No. 86; Torsa Valley, alt. 1800 ft., January 1905, G. L. Searight No. 283.

CHINA.—Yunnan: Szemao, Western Mts. alt. 5000 ft., A. Henry No. 12878; Yunanchiang, alt. 2500 ft., a shrub 6 ft. spreading, A. Henry No. 13227.

A very distinct species with pendulous branches, lanceolate-ovate leaves, usually in threes, and with a sparingly branched panicle. The style is very far exerted, up to nearly twice as long as the corolla tube. The clavate stigma is a distinctive characteristic.

DOUBTFUL SPECIES.

Wendlandia (?) *arabica* Delfers in Bull. Soc. Bot. France, xliii (1896), p. 104.

An erect shrub from Reyami in the central mountainous region of the province of Yemen in Arabia. From the description of this species it is apparently not a typical *Wendlandia*, but may be allied to *W. Kotschyi* Boiss.

Wendlandia bowardioides Hutch. in Sargent Plant. Wils. iii (1916), p. 393.

CHINA.—Yunnan: Mengtze, south-east mountain forests, alt. 5000 ft., a shrub, 6 ft., flowers red, A. Henry No. 10956, (type).

This species, if a *Wendlandia*, would form an aberrant member of the sub-series *Paniculatae*, but it differs so markedly in inflorescence and flower from the other members of this sub-series, and, in fact, from all other species in the genus, that it seems preferable, until we know more of the plant, to omit it from the general classification. The fruits are too young to determine with certainty the genus to which it belongs. Hutchinson notes that the plant recalls certain species of *Bouvardia*; it is not unlike some species of *Adenosacme*.

Wendlandia cambodiana Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 64.

This species is, from the description, apparently allied to *W. paniculata* DC. but the material is in too imperfect a state to determine its proper position.

Wendlandia densiflora (Blume) DC. Prod. iv (1830), p. 412; Steud. Nom. Bot. (1841), p. 786; Don, Gen. Syst. iii (1834), p. 518; Wight et Arn. Prod. (1834), p. 403; Miquel Flor. Ind. Batav. ii (1860), p. 158 pro parte; Miq. Ann. iv (1869), p. 221 pro parte (except syn. *W. trichantha* et *W. dasythyrsa*); Ann. Jard. Bot. Buitenzorg iv (1884), t. 5, fig. 26; Boerlage, Hand. Flor. Ned. Ind. ii (1891), p. 123 pro parte (except syn. *W. trichantha* et

W. dasythyrsa); Koorders et Valetton in Bijdr. Boomsort. Sp. Java viii (1902), p. 59.

Rondeletia densiflora Blume, Bijdragen Flor. Ned. Ind. (1825), p. 974.

Wendlandia densiflora DC. l.c. et Don, l.c. by error in spelling.

This species was described by Blume from a single fruiting specimen collected by himself on the mountains of Tjeerimai in the province of Cheribon, Java. The species has apparently never been found again.

Blume's very brief description affords no certain clue to the affinity of this plant. The type has been examined by Dr. Koorders and Valetton. They state that the stipules are broadly triangular, blunt or pointed and adpressed, not reflexed. The midrib is always prominent and the leaves are densely pubescent below except on the margin near the apex. Apart from this they note that it seems to be exactly similar to *Wendlandia rufescens* Miq.

Further, they consider that since the stipules play an important part in the classification of the genus *Wendlandia* they would not unite *W. densiflora* (Blume) DC. with *W. rufescens* Miq. I entirely agree with this view. The stipular character can, as far as my experience goes, be relied upon, and *W. densiflora* (Blume) DC. would not belong to the sub-series *Paniculatae* but either to the *Tinctoriae* or *Cuspidatae* according to the stamens, which have not been described. I, therefore, follow Koorders and Valetton in regarding *W. densiflora* (Blume) DC. as a distinct species, but have not been able to classify it. Specimens from the Buitenzorg Botanic Garden, in the Calcutta Herbarium, marked *W. densiflora*, are, in my opinion, merely forms of *W. glabrata* DC.

Wendlandia Kotschyi Boiss. et Hohenack. in Diag. Plant. Nov. ser. I. iii (1842), p. 55; Jaubert et Spach Illustr. Pl. Oriental. iii (1847-50), t. 202; Boiss. in Flora Orientalis iii (1875), p. 10.

Sestinia ligustrioides Boiss. et Hohenack. in Kotschy, Plant. Allepp. Kurdistan evit. Hohenack. (1843), No. 371.

KURDISTAN. In rupibus vallium montis Gara, 1841, Kotschy No. 371, (type), in Herb. Brit. Mus.

A small-leaved shrub with the habit of *Ligustrum vulgare*, fully described by Boissier and by Jaubert and Spach. In habit and inflorescence this species is nearest the series *Montegenae*, but the stamens in *W. Kotschyi* Boiss. are less exerted than in the two species of this series, although quite as exerted as in the *Euexsertae* series. I have examined the ovary which appears to agree with Jaubert's and Spach's figure, but the material is very young, and I have been unable to determine the structure with certainty. This species, if included in the genus *Wendlandia*, is exceptional.

Bentham considered it to be a species of *Rondeletia*. Pending further investigation into the characters which separate this and other closely allied genera I should retain *W. Kotschyi* Boiss. in the genus, but hesitate to link it with *W. subalpina* W. W. Smith, and *W. longidens* Hutch, which are also not quite typical *Wendlandias*.

Wendlandia photinifolia Pierre ex Pitard in Flore Générale de l'Indo-Chine iii (1922), p. 67.

From the very inadequate material I have seen, I would regard this species as a close ally of *W. tinctoria* DC., possibly a form of the sub-species *orientalis*. In view of the uncertainty of the position of this species and minor differences in form, I have not adopted this name for the Burmese and Siamese plants.

Wendlandia proxima (Don) DC. Prod. iv (1830), p. 411; Don, Gen. Syst. iii (1834), p. 518; Steud. Nom. Bot. (1841), p. 786.

Rondeletia proxima Don, Prod. Florae Nepalensis (1825), p. 139.

The original description states that the leaves are elliptic, acuminate, clothed with tomentum beneath, as well as on the branchlets; the panicles are very hairy; the flowers are much crowded, and the limb of the corolla is one half shorter than the tube; the calyx teeth are short and obtuse. There is a note that *W. proxima* is nearly allied to *R. exserta*, but in the latter the leaves are more canescent, the limb of the corolla is about equal to the tube, the calyx teeth are ovate and acute. The plant described came from Sylhet in Assam.

Wight and Arnott (Prod. i, 1834) p. 402, suggest that *W. proxima* may be merely a form of *W. exserta*, but the corolla tube differs and *W. exserta* DC. does not extend so far east. In the Flora of Brit. India iii (1872), p. 38, Hooker reduces *W. proxima* DC. to *W. tinctoria* DC.

It seems likely that Don's plant may be *W. scabra* Kurz, the Assam form of *W. paniculata* DC. (Wall. Cat. 6267 B). From the description the flower characters apparently agree, and the round reflexed stipules are similar to those of *W. exserta*. The mystery regarding Don's *W. proxima* is, however, never likely to be solved.

Sir D. Prain writes (Ann. Roy. Bot. Gard. Calc. viii (1898), p. 328) to the following effect. :—Don published his Prodrum Florae Nepalensis from the collections of Buchanan-Hamilton and of Wallich, in the herbarium of Mr. Lambert. These did not form part of the Wallichian Herbarium. When Mr. Lambert died this herbarium was sold and the bundles which contained Don's types went for almost nothing. Later they were apparently thrown aside for rubbish, and Sir David, after considerable search, was unable to trace them.

Wendlandia Teysmanniana Miq. Flor. Ind. Batav. ii (1860), p. 346, et Ann. iv (1869), p. 222; Boerlage, Hand. Fl. Ned. Ind. ii (1891), p. 123.

Miquel described this species from incomplete material and he never saw or described the flowers. The plant to which he gave this name is probably a Sumatran form of *W. glabrata* DC. The stipules are cuspidate and the receptacle is glabrous. I have not seen Miquel's specimens, but in any case their affinity could not be determined in the absence of corolla and stamens.

SPECIES EXCLUDED FROM THE GENUS

Wendlandia basistaminea F. Mueller in Victorian Naturalist, March 1892; Bot. Cbl. 1 (1892), p. 125; Bailey, The Queensland Flora iii (1900), p. 746, Comprehensive Cat. Queensland Plants (1913), p. 237 t. 207.

QUEENSLAND: A shrub (?) From Russell River, Stephen Johnson.

Mueller notes that this Australian plant is very different from the New Guinean *W. buddleacea* described by him, and yet considers it to be a *Wendlandia* on the ground that the variability of species in the genus may be greater than hitherto admitted.

His description and figure as well as the name, clearly show that the stamens in *W. basistaminea* are fixed at the base of the corolla tube, not between the corolla lobes and, consequently, they are included in the corolla tube at maturity. In this character *W. basistaminea* differs markedly from any *Wendlandia*, and must, therefore, be definitely excluded from the genus.

Wendlandia bifaria Wall. Cat. 6278 = *Urophyllum hirsutum* Wight.

Wendlandia caroliniana Nutt. Gen. Am. i (1818), p. 241 = *Cocculus carolinus* DC. Syst. i (1818), p. 524.

Wendlandia corymbosa Wall. Cat. 6276 = *Greenia Jackii* Wight et Arn.

Wendlandia Lawsoniae DC. Prod. iv (1830), p. 413 = *Hedyotis Lawsoniae* Steud.

Wendlandia longifolia DC. Prod. iv (1830), p. 412 = *Adenosacme longifolia* Wall.

Wendlandia malayana Don, Gen. Syst. iii (1834), p. 519 = *Adenosacme longifolia* Wall.

Wendlandia papuana Lautb. in K. Schum. et Lautb. Nachträge (1905), p. 390 = *Premna* sp.

Wendlandia pilosa G. Don Gen. Syst. iii (1834), p. 519 = *Bertiera spicata* K. Schum.

Wendlandia psychotrioides F. Muell. Vict. Natural. viii (March 1892), p. 178 = *Oldenlandia psychotrioides* F. Muell.

Wendlandia populifolia Willd. Sp. Pl. ii (1799), p. 275 = *Cocculus carolinus* DC.

- Wendlandia racemosa* G. Don, Gen. Syst. iii (1834), p. 519 = *Bertiera racemosa* K. Schum.
Wendlandia scandens G. Don, Gen. Syst. iii (1830), p. 520 = *Rondeletia scandens* Roxb (?)
Wendlandia secunda Griff. Notul. iv (1854), p. 266, in Posthumous Papers = *Greenia Wightiana* W. et A.
Wendlandia spicata DC. Prod. iv (1830), p. 412 = *Greenia Jackii* Wight et Arn.
Wendlandia sulcata G. Don, Gen. Syst. iii (1834), p. 519 = *Bertiera* sp.
Wendlandia tetrandra DC. Prod. iv (1830), p. 412 = *Hedyotis macrophylla* Wall.
Wendlandia virgata G. Don, Gen. Syst. iii (1834), p. 519 = *Pouchetia africana* DC.
Wendlandia Wightiana Wall. Cat. 6277 = *Greenia Wightiana*, W. et A.

APPENDIX.

The *Wendlandias* of Wallich's Catalogue and Herbarium.

Reference has been made to the Wallich Herbarium which contains the types of many of the Indian *Wendlandias*. The catalogue numbers 6266 to 6279 correspond to these sheets. Under each number there are usually several sheets which have in some cases been distinguished by the letters A, B, C, etc. More than one species is often included under one number, sometimes even under one letter; there are also instances where two quite distinct species have been mounted upon one sheet. Further the Wallichian sheets in other herbaria do not exactly correspond to those of the same number in Wallich's own Herbarium at Kew.

In order that there may be no doubt as to which of the specimens have been cited in the preceding account of the species, a list of the Wallichian specimens examined, with their determinations, is here given as an appendix.

Wall. 6266 A. Under this number and letter, specimens have been distributed which belong to two distinct species readily distinguished by their stipules.

Firstly the type of *Wendlandia paniculata* DC. represented by:—

- (1) The upper specimen on the Wall. Herb. (Kew) sheet.
- (2) One sheet in Herb. Edin.
- (3) One sheet in Herb. Kew.

They are marked "*Rondeletia paniculata* Roxb. ex. H(ort.) B(ot.) C(alcutt.)" and were taken from a plant raised at Calcutta from seed of the Amboyna plant and are Roxburgh's type.

Secondly *Wendlandia grandis* Cowan, represented by:—

- (4) The lower specimen on the Wall. Herb. (Kew) sheet (cf No. 1).
- (5, 6) Wall. Cat. 6266 (without letter) "*W. paniculata* Roxb." in Herb. Calcutt.—two sheets.

- (7) Wall. Cat. 6266 (without letter) "*W. budleoides* Wall. Sylhet," in Herb. Calcutt.—one sheet.
 (8) Wall. Cat. 6266 A. *W. paniculata* Roxb. one sheet in Herb. Calcutt.

These are from the mountains of Sylhet.

Regarding the identification of specimens No. 5-8 there is no uncertainty, No. 4 has no visible flowers and somewhat shorter stipules than on the other sheets, but otherwise agrees.

Wall. 6266 B. There are again two species under this number.

Firstly *Wendlandia grandis* Cowan represented by :—

- (9) The upper specimen on the Herb. Wall. sheet.
 (10, 11) Two sheets in Herb. Edin.
 (12) One sheet in Herb. Kew.
 (13) One sheet in Herb. Calcutt.

Wallich called specimen No. 9 "*Rondeletia exserta* Roxb. forsan alia." He has noted in the Catalogue "vix non dist. sp. *Wend. budleoides* Wall." There is a pencil note on the sheet "*W. exserta* Roxb. var. *grandis* J. H." (Hooker), but in the Flora of British India iii (1882), p. 38, Wall. Cat. 6266 B is the type of *W. tinctoria* DC. var. *grandis* Hook. f. All the above specimens are from Sylhet.

Secondly *Wendlandia tinctoria* DC. The specimen has a drooping inflorescence but may be regarded as a form of the above species, with which it otherwise agrees.

There is one specimen

- (14) The lower specimen in Herb. Wall. (cf. No. 9).

It is marked "No. 133 *Rondeletia* ? 6266 B Jentya, March 1819."

Wall. 6267 A. *Wendlandia exserta* DC. Represented by :—

- (15) One sheet in Herb. Wall.

The sheet is marked "*Rondeletia exserta* Roxb. Herb. Roxb." No locality is given—this specimen is Roxburgh's type.

Wall. 6267 B. *Wendlandia scabra* Kurz.

The following specimens bear this number and all are of the same species. :—

- (16) One sheet in Herb. Wall.
 (17) One sheet in Herb. Kew.
 (18) One sheet in Herb. Edin.
 (19, 20) Two sheets in Herb. Calcutt.

On the Wall. Herbarium sheet (No. 16) Wallich has noted "*Rondeletia* an. *exserta* R (?) Nepal 1821." Hooker has written below "*W. paniculata* DC. J. H."

All the specimens under 6267 B are undoubtedly *W. paniculata* using the name in its widest sense. They differ markedly from the

true *W. paniculata* (Roxb.) DC. (Wall. No. 6266 A), the Amboyna plant. Several sheets quoted above are marked Nepal but the specimens exactly agree with the Assam and Burmese plant *W. scabra* Kurz. These are the only record of this species occurring west of Assam. If the Wallich specimens actually come from Nepal it is peculiar that the species has not been found in Sikkim. It seems more probable that specimens were mixed by the mounters than that Nepal is the correct locality. One sheet has an Assam locality upon it as well as Nepal. I suggest that these specimens were actually collected in Assam, and suspect that there has been some confusion between this number and No. 6269 B. In the Wall. Herbarium the sheet bearing the latter number has a large specimen of *W. scabra* Kurz (No. 38) from Cherrapunji mounted upon it, and a smaller specimen to the right. From the description the latter specimen only is the type of *W. Wallichii* W. et A. although this number is quoted without reservation. They may of course not have seen the Wallich Herbarium sheet, but only one of the others (Nos. 41 and 42) which bear a single specimen.

Wall. 6267 C. *Wendlandia exserta* (Roxb.) DC. from Oude.

(21) One sheet Herb. Wall.

(22) One sheet Herb. Kew.

Wall. 6267 D. *Wendlandia exserta* (Roxb.) DC. from Hardwar.

(23) One sheet Herb. Wall.

Wall. 6267 E. *Wendlandia exserta* (Roxb.) DC. from E. Kumaon.

(24) One sheet Herb. Wall.

(25) One sheet Herb. Calcutt.

These are *Rondeletia cinerea* Wall.

Wall. 6267 F. Two distinct species are included under this number, these and 6267 G are all mounted upon one sheet.

Firstly *Wendlandia tinctoria* DC. represented by:—

(26) The top left specimen in Herb. Wall. named "*Bertiaria Tilia* Nainayi, 30th March 1810", under which C. B. Clarke? has written "*W. tinctoria* var. *proxima* DC."

Secondly *Wendlandia exserta* Roxb. DC.

(27) Bottom left specimen in Herb. Wall. No locality is given.

Wall. 6267 G. *Wendlandia thyrsoides* (Roth) Steud.

(28) This specimen is on the same sheet in Herb. Wall. as are his 6267 F specimens, but to the right of the others (Nos. 26, 27).

It is inscribed "*Rondeletia vix non exserta Rondeletia thyrsoides* Herb. Heyneanum."

Wall. 6268. *Wendlandia exserta* (Roxb.) DC.

- (29) One sheet Herb. Wall.
 (30, 31) Two sheets Herb. Kew.
 (32) One sheet Herb. Edin.
 (33, 34) Two sheets Herb. Calcutt.

This number is the type of *Rondeletia cinerea* Wall. All the specimens are from Nepal. The flowers are more definitely fascicled and the leaves are greyer upon the under side than in specimens of *W. exserta* under No. 6267. The difference, however, is scarcely enough to warrant separation. Intermediate forms are found in other collections.

Wall. 6269 A. *Wendlandia grandis* Cowan.

- (35) One sheet Herb. Wall.
 (36) One sheet Herb. Calcutt.
 (37) One sheet Herb. Brit. Mus.

Wallich has named this Eastern Sylhet plant *Rondeletia tinctoria*.

Wall. 6269 B. Two distinct species are found under this number.

Firstly *Wendlandia scabra* Kurz (vide note under 6267 B).

- (38) The left hand specimen named "*W. paniculata* DC., J. H." on the sheet in Herb. Wall.
 (39) One sheet numbered 6269 without letter in Herb. Calcutt. from Sylhet.

These are marked by Wallich, "*Rondeletia* Cherra Poonji."

Secondly *Wendlandia Wallichii* W. et A.

- (40) The right hand specimen on the same sheet as (38).
 (41) One sheet Herb. Kew.
 (42) One sheet Herb. Calcutt.

All these are from Sylhet and include the type of *W. Wallichii* W. et A. No. 40 is a very poor specimen, so that it seems more likely that Wight and Arnott described one of the other two specimens.

Wall 6269 C. *Wendlandia puberula* DC.

- (43) One sheet Herb. Wall.
 (44) One sheet Herb. Kew.
 (45) One sheet Herb. Edin.
 (46, 47) Two sheets Herb. Calcutt.

All are from Kumaon.

Wall. 6269 D. The specimens under this number are not identical.

Firstly *Wendlandia tinctoria* DC. sub. sp. *cinnamomea* Cowan, or at least very near to this.

- (48) The upper specimen on a sheet in Herb. Wall. marked "*Bertiera Tilia* Sukanagar, 17th March 1810."
 (49) The lower specimen on the above sheet marked "*Bertiera Tilia* 6269 D2 Nawabganj, 22nd February 1802."

- (50) One sheet in Herb. Kew.
 (51) One sheet in Herb. Edin.
 Secondly *Wendlandia tinctoria* DC. vel. aff.
 (52) One sheet in Herb. Wall. No. 6269 D3.
 There are three specimens upon this sheet which are identical.

Wall. 6270. Two distinct species have been distributed under this number and they are easily distinguished by their stipules.

Firstly *Wendlandia puberula* DC.

- (53) A sheet in Herb. Wall. with specimens in flower and fruit.
 (54, 55) Two sheets in Herb. Kew.
 (56) One sheet Herb. Edin.
 (57) One sheet Herb. Calcutt.

No. 53 is the type of *W. puberula* DC. All are from Nepal, 1821.

Secondly *Wendlandia appendiculata* Wall. MS. descript. Cowan.

- (58) The specimen in Herb. Wall, marked "*Rondeletia appendiculata* Wall. Makole (?) April 1821" (in flower). It was named "*W. paniculata* (?) J. H.", the name afterwards having been erased. There is a note on the sheet, "stipules of *paniculata*, flowers of *puberula*."
 (59, 60) Two sheets Herb. Kew.
 (61) One sheet Herb. Calcutt.
 (62) One sheet Brit. Museum, lower specimen only, shows the flowers well.

These represent the type of this species.

Wall. 6271. *Wendlandia tinctoria* (Roxb.) DC.

- (63) One sheet in Herb. Wall. inscribed "*Rondeletia nitida* Wall. Attran R27/327, *Wendlandia nitens* Wall. Attran River."
 (64) One sheet in Herb. Calcutt.

Although flowers are almost wanting on sheet No. 63 there is little doubt that the specimen is *W. tinctoria* DC. The Calcutta sheet bears out this determination. Hooker in the Flora of British India, describes *W. nitens* Wall., quoting this number. He did not, however, describe the specimens referred to here. His description is mainly of Helfer's specimen from the Attran River (Kew. Distrib. No. 2380). Helfer's plant, which I have seen, is not in the Wallich Herbarium, and it differs markedly from the two sheets quoted above (Nos. 63, 64). *W. nitens* Hook. non Wall. (Helfer's plant) agrees with Wall. No. 6272 pro parte and is *W. ligustrina* Wall.

Wall. 6272. Under this number there are four sheets, the fourth (without flowers) differing from the others.

Firstly there is *Wendlandia ligustrina* Wall.

- (65) One sheet in Herb. Wall. marked "*Rondeletia ligustrina* Wall. Taong Dong, 25th Nov. 1827"—This is the type of *W. ligustrina* Wall.

(66, 67) Two sheets in Herb. Calcutt.

(Helfer's specimens under Kew Distrib. No. 2380 described by Hooker under the name *W. nitens* agree with these numbers.)

Secondly *Wendlandia tinctoria* DC. (?)

(68) One sheet in Herb. Calcutt.

The specimen lacks flowers and is too poor for certain identification. It may be under a wrong number as is suggested upon the sheet.

Wall. 6273 A. *Wendlandia thyrsoidea* (Roth) Steud.

(69) The upper specimen on the sheet in Herb. Wall. (a) Nilghirry E. Nolan.

(70) The lower specimen (cf. 69) marked "B (?) *Ixora congesta*, Roxb. Herb. Wight, Nilghirry Hills."

(71) One sheet in Herb. Calcutt.

The first is the type of *W. Notoniana* Wall. (cf. 6267 G.)

Wall. 6273 B. *Wendlandia thyrsoidea* (Roth) Steud.

(72) The upper specimen on the sheet in Herb. Wall. marked "*Ixora congesta*, Roxb. Nilghirry Hills."

(73) The lower specimen on the same sheet, too poor to be determined with certainty.

Wall. 6274. *Wendlandia Heyneana* Wall., descript. W. et A.

(74) The upper specimen in the Herb. Wall. sheet marked "*R. americana*."

(75) The lower specimen on the same sheet marked "*R. Hamiltoniana*. R. Heyne, 25th Dec. 1816."

(76) One sheet Herb. Kew.

(77) One sheet Herb. Edin.

(78) One sheet in Herb. Calcutt.

(79) A second sheet in Herb. Calcutt. marked in error No. 6275. Watt notes that the numbers 6274 and 6275 have been transposed.

The Wallich Herbarium specimens (Nos. 74, 75) are the type of *Rondeletia Heyneana* Wall. Cat. 6274 and of *W. Heyneana* W. et A. This species was reduced to *W. glabrata* DC. in the Flora of British India, but is here regarded as distinct from the Javanese plant.

Wall. 6275. *Wendlandia pendula* DC.

(80) One sheet Herb. Wall.

(81, 82) Two sheets Herb. Kew.

(83) One sheet Herb. Calcutt.

The Wallich Herb. specimen is the type. All are from Nepal, 1820.

Wall. 6276. *Greenia* sp. *Wendlandia* ? *corymbosa* in Wall Cat.

Wall. 6277. *Greenia* sp. *Wendlandia* ? *Wightiana* in Wall. Cat.

Wall. 6278. *Urophyllum* sp. *Wendlandia bifaria* in Wall. Cat.

Wall. 6279. *Wendlandia coriacea* DC.

(84-86) Three sheets in Herb. Wall.

(87) One sheet Herb. Kew.

(88) One sheet Herb. Edin.

(89, 90) Two sheets Herb. Calcutt.

All are from Nepal, 1821, and constitute the type of *W. coriacea* DC.

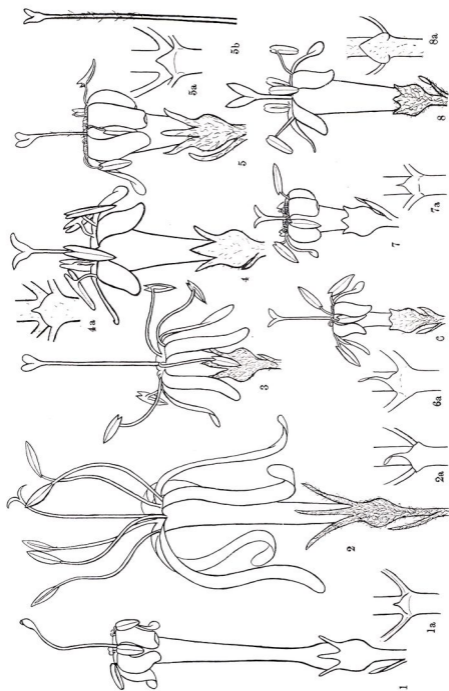
EXPLANATION OF PLATES.

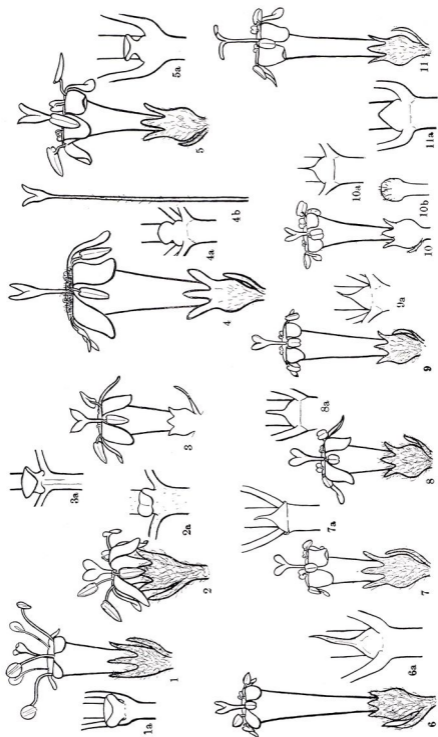
PLATE CCXXXII—Fig. 1. *W. pendula*. Fig. 2. *W. logidens*. Fig. 3. *W. subalpina*. Fig. 4. *W. sikkimensis*. Fig. 5. *W. ligustrina*. Fig. 6. *W. salicifolia*. Fig. 7. *W. formosana*. Fig. 8. *W. puberula* (All $\times 8$.)

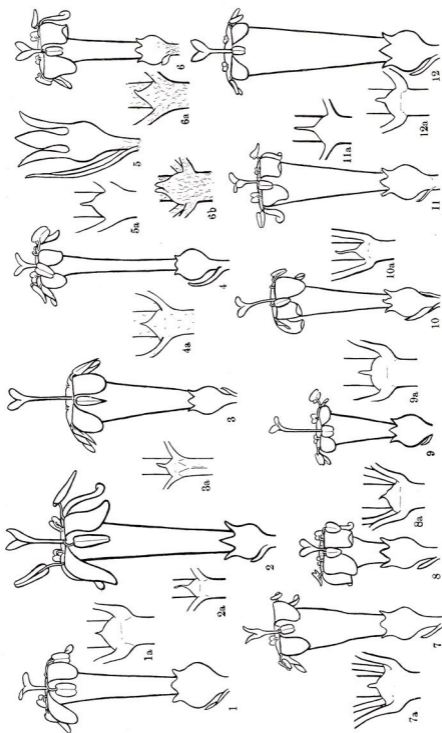
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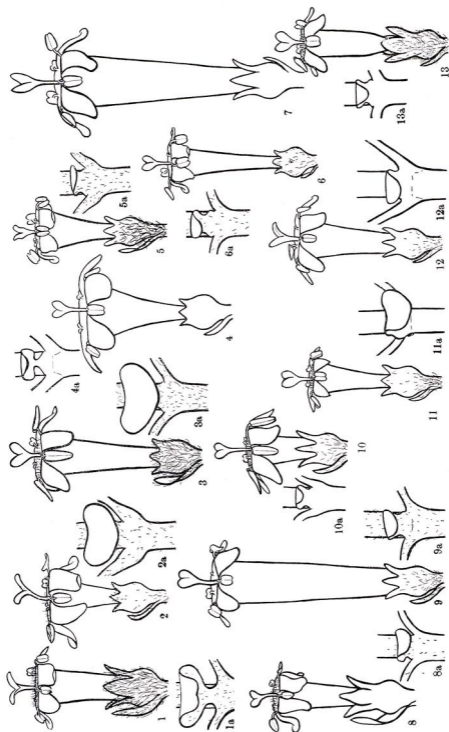
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